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MENTAL ARITHMETIC,

OR

FIRST LESSONS IN NUMBERS.

FOR CHILDREN.

By JAMES B. THOMSON, A. M.,
AUTHOR OF "PRACTICAL ARITHMETIC," EDITOR OF "DAY'S ELEMENTS ALGEBRA," "LEGENDRE'S GEOMETRY," &c.

TWELFTH EDITION, REVISED AND ENLARGED.

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RECOMMENDATIONS.

THE ATTENTION OF TEACHERS AND SUPERINTENDENTS IS RESPECTFULLY INVITED TO THE FOLLOWING RECOMMENDATIONS OF

THOMSON'S MENTAL ARITHMETIC.

From E. G. STORKE, *Esq., County Superintendent, Cayuga County, N. Y.*

Messrs. J. C. DERBY & Co.:—I am much pleased with "Thomson's First Lessons" in Arithmetic. I am convinced that it is more happily adapted to the *public school room*, than any other mental arithmetic now extant. In those which I have used I have generally met with this difficulty—they were either too simple or too abstruse; being adapted to the nursery, or else beyond the reach of those for whom they were intended. Although Colburn's work is faultless in every other respect, it will still be admitted, I think, that its progress is much too rapid for children from five to nine years of age. For those as well as for others more advanced, I hazard nothing in saying that practical teachers will find the work of Professor Thomson peculiarly fitted; and that it will be speedily introduced and generally used, is the confident expectation, and sincere wish of

Yours, respectfully and truly,

E. G. STORKE.

Auburn, May 9, 1846.

From WM. F. PHELPS, *Esq., Teacher of the Model School attached to the New York State Normal School.*

I fully concur in the above recommendation of Mr. Storke, and take pleasure in adding that the plan and arrangement of the work are superior to any with which I am acquainted. The directions for using that almost indispensable piece of apparatus, the *Numerical Frame*, and the notes for the aid of the young teacher, contribute greatly to its usefulness and value, and are sufficient to commend the work to every teacher of Common Schools.

WM. F. PHELPS.

Albany, May 15, 1846.

From L. S. PARSONS, *A. M., Principal of Albany Female Academy.*

I have examined Thomson's "First Lessons" in Arithmetic, and am fully of the opinion that it is exceedingly well adapted to the capacities and wants of children.

It begins with the simplest combinations of numbers, and very gradually passes to larger ones. The examples refer to sensible objects with which the child is familiar, and the illustrations of the elementary principles of numbers are so lucid that the child cannot fail to comprehend them.

The notes explanatory of the use of the Numerical Frame will be found highly useful and acceptable to teachers.

I can heartily recommend the work to the attention of teachers and school committees as admirably fitted to the design of the author and the wants of the learner.

L. S. PARSONS.

Albany, May 14, 1846.

Extract from the Report of the Committee on Text Books, Ontario Co., N. Y., Oct., 1846.

The undersigned, a Committee appointed by the Ontario Co. Teacher's Institute, to report upon the merits of Text Books, &c., beg leave to report, that they have examined, with care, Thomson's 'First Lessons,' and Thomson's 'Practical Arithmetic,' that they consider them works of *decided merit*, and when compared with other works upon the same subject, they present superior claims to the attention of those engaged in teaching or studying Arithmetic."

After giving the reasons for their opinion, they concluded by recommending both books to the schools of the county, and the report was adopted.

Signed by ALONZO BEEBE, County Sup't. and others.

From J. REDFIELD, ESQ., *County Sup't., Wayne County, N. Y.*

DEAR SIR,—After a fair examination of Thomson's "First Lessons," and Thomson's "Practical Arithmetics," I am happy to be able to express my hearty approbation of them.

The "First Lessons," or the "Mental Arithmetic," seems peculiarly adapted to the capacities of children, and I believe will prove a valuable acquisition to our schools. It is calculated to interest the pupil and to inspire a love for the science, which for want of proper elementary works has invariably been irksome and dull to young minds.

I cannot commend the "Practical Arithmetic" in stronger terms, than to endorse the language of Prof. Stanley, of Yale College. It is a work which we have long needed, and I doubt not will be universally adopted as a text book in our common schools. Respectfully, yours, JAMES REDFIELD.

Clyde, Dec. 1846.

From J. M'GIFFERT, *A. M., Sup't. Com. Schools, Greenport, N. Y. late Prof. Mathematics, city of New York.*

Thomson's "Mental Arithmetic" I think is much the best I have ever examined. It seems to me to be the very thing needed by the youthful mind, when first entering upon the science of numbers. JAMES M'GIFFERT.

From R. F. HICKS, *Esq., County Superintendent, Livingston Co., N. Y*

DEAR SIR:—The Committee appointed at the late session of our Institute for the purpose of examining text books, reported unanimously in favor of your arithmetics, and their report was adopted by the Institute.

I am of opinion that the works will meet with distinguished success.

Dansville, Dec., 1840. Respectfully yours, R. F. HICKS.

From G. W. FRANCIS, A. M., *Principal of Boy's Boarding School, Westchester Co., N. Y.*

J. B. THOMSON, ESQ.:—Dear Sir: I introduced your Algebra into my school soon after its publication. I was so well pleased with it, that, when I saw a notice of your intention to publish an Arithmetic, I was solicitous to see it. I have now introduced your Mental and Practical Arithmetics into my school and I have never used any Arithmetics which met my views so well. I shall avail myself of the advantages of your Higher Arithmetic as soon as it is published.

Sincerely yours,

Yonkers, Nov., 1846. G. W. FRANCIS.

From A. W. HOLDEN, *Esq., County Sup't. of Warren Co., N. Y.*

I have examined the Mental and Practical Arithmetic of J. B. Thomson, A. M., *and am so well satisfied* of their excellence and utility, that I can cheerfully *recommend them* for the use of the schools in this county.

Glens Falls, Aug. 1846. AUSTIN W. HOLDEN.

From WILLIAM HOPKINS, *A. M., Principal of Auburn Academy.*

I have examined Thomson's Primary Arithmetic, and take pleasure in saying that I am much pleased with its plan and execution. The examples are practical and well chosen, the lessons are happily arranged, making the transition from easy combinations of numbers to more difficult ones so gradual as to avoid the common error of passing from simple to abstruse questions before the capacity of the learner is prepared for it, while on the other hand they are sufficiently progressive to awaken his curiosity and stimulate him to exertion. I am persuaded the work is better adapted to the wants of the pupil and the convenience of the teacher, than any other Mental Arithmetic with which I am acquainted.

Auburn, May 26, 1846. M. HOPKINS.

From the examination that I have given to Thomson's Primary Arithmetic, I am fully prepared to concur in the above recommendation.

GEO. R. RUDD, Principal of Auburn Female Seminary.

We heartily concur in the above recommendation of Messrs. Hopkins and Rudd.

TERRY EVERSON,
CHAS. P. WILLIAMS,
LEWIS PADDOCK,
W. BOYNTON, Jr.,
} Teachers of the Public Schools, Auburn, N. Y.

From REV. J. M. GARFIELD, *D.D., Rector of the Albany Female Seminary.*

J. C. DERBY, Esq.—Dear Sir: I have examined Thomson's "Mental Arithmetic, or First Lessons in Numbers," lately published by you, and think it sustains the reputation which its well known author has justly acquired by his former mathematical works. I think the work so well adapted to the purposes of juvenile instruction, that I have adopted it as a primary class book in the Albany Female Seminary. Yours, very respectfully,

J. METCALF GARFIELD.

Albany, May 19, 1846.

From E. C. POMROY, *Esq., County Superintendent for the Western section of Onondaga Co., N. Y.*

J. B. THOMSON, A. M.—Dear Sir: I have just been examining your "Mental Arithmetic" for children, and it is justly your due for me to say, that I esteem it one of the best things of the kind with which I am acquainted.

The *selection, arrangement, and presentation* of its matter is very happily designed to attract attention and awaken inquiry on the part of the pupil, while it will assist his memory in retaining the knowledge acquired by the different steps, and lead him to a systematic and consecutive mode of thinking. This habit is of great importance. Your Primary Arithmetic is certainly a *treasure* when viewed in this light.

Another excellent feature is, that it begins and ends in just the right places for a work of its kind, and in just the right way.

Knowing you to have been long engaged in promoting the cause of education, and recognizing you as a friend and ornament of the *Teacher's Profession*, you must allow me to subscribe myself,

Yours, with the highest respect and esteem,

Otisco, May 20, 1846. E. C. POMROY.

From C. A. PARSONS, *A. M., Town Superintendent of Public Schools, Auburn, N. Y.*

JAMES B. THOMSON, Esq.—Dear Sir: I regard it as indispensible to the pupil's success that he should never lose the idea that he is progressing

Few School Books have perhaps proved more generally useful than Colburn's Mental Arithmetic. Yet Colburn's work has this fault, with classes taking their first lessons in figures. They advance to a certain point when they must be put back and begin anew, for the reason that their capacity cannot grow with the advance so suddenly made from the simple principles of numbers: the operation is repeated until pupils tire and become discouraged in consequence. Nothing can more certainly dampen the warm and curious impulse, with which a child opens upon anything new when rightly presented to him.

I consider your "First Lessons in Numbers" as admirably guarded in this respect, and most cordially recommend them as a *desideratum* much needed in our schools for the use of that class of children for whom they were intended.

I am, most truly, yours,

Auburn, May 20, 1846. C. A. PARSONS.

It is believed that children may be profitably instructed in mental arithmatic, as one of their earliest exercises. The works that have been mostly in use, for this purpose, are Colburn's Mental Arithmetic, and Emerson's First Lessons. The former is too difficult for beginners, and is seldom mastered, except by the most gifted of the class. The latter is too puerile, and confines the attention too much to sensible objects. We think Mr. Thomson has avoided the faults of both. His system "commences with practical examples which relate to familiar objects and requires the simplest combinations. The pupil is then introduced to others involving the same principle but somewhat harder, special care being taken to make the transition *very gradual*, so that instead of being disheartened at the ruggedness of the way, he shall be stimulated to take the next step by the hope of victory."—*Cayuga Patriot.*

Mr. Thomson has already been very successful as the author of several works of a higher character—and it will be a source of pleasure to many who have become acquainted with his former efforts, to learn of his present work for the young. This, it will be noticed, is intended as comprising the *first lessons in numbers*, and SIMPLICITY has therefore been sought in all its rules, as well as in all its examples. Every effort seems to have been made to bring all things relating to it down to the youngest capacity. As one example it may be mentioned, owing to the fact that "children comprehend and remember words more easily than figures, and reason upon them with so much greater facility, the numbers and tables in the first part of the book, are expressed in words." Taken as a whole, it is admirably adapted for the class for whose benefit it is specially intended; and we rejoice to learn that it has already been very generally introduced into most of the schools in this vicinity.—*Auburn Daily Advertiser.*

PRACTICAL ARITHMETIC.

From Prof. V. DREW, *A. M., Prin. of Eng. and Classical Institute, N. Y. City—to Prof.* WEST, *Principal of Rutgers Institute, New York.*

Dear Sir,—By request of the publishers, I present you a copy of "Thomson's Practical Arithmetic;" a work which I have just adopted in school. *My rule has been not to* recommend a book which I have not fully tested by *use; but, in the present* case, I must say, from a fair examination, I consider *this Arithmetic* as decidedly the best that has appeared. In nearly *every Article something* is gained in the mode of presenting the subject,

perspicuity, and practice, being remarkable throughout. Notwithstanding the late improvements in such works, I should not be surprised should this production soon become the general favorite

New York, May 4, 1846. V. DREW.

Extract from Rev. SAMUEL J. MAY, *late Principal of State Normal School, Lexington, Mass.*

JAMES B. THOMSON, Esq.—Dear Sir: I have given some time to the examination of your "Practical Arithmetic;" and am happy in being able to speak of it in terms of high commendation. The plan is excellent, and the execution of the plan, so far as I have examined, is thorough. It is the best offspring, I have yet seen, of the improved method of teaching Arithmetic. Wishing you an ample reward for your labors, in the preparation of books, to assist in the instruction of the young,

I remain your sincere friend,

Syracuse, May 6, 1846. SAMUEL J. MAY.

From L. W. HALL, *A.M., Author of Moral Philosophy, and Principal of Ravenna High School, Ohio.*

J. B. THOMSON, Esq.—Dear Sir: I have derived much satisfaction from an examination of your "Practical Arithmetic," and my appreciation of its merits will be best expressed by the statement of the fact that I intend to introduce it into my school, at the earliest practical moment. Its thoroughly *practical* character is what gives it great value in my estimation, and in this respect it greatly excels any Arithmetic with which I am acquainted.

Ravenna, Ohio, May 19, 1846. L. W. HALL.

From Rev. GEO. W. THOMSON, *Principal of Onondaga Academy, New York.*

MR. THOMSON—Dear Sir—From the examination I have been able to give your "Practical Arithmetic," I consider it a valuable addition to that class of books. It contains many improvements and items which are not found in other Arithmetics. Your edition of "Day's Algebra," I am also very much pleased with. I shall introduce both of them into my school as soon as possible.

Very respectfully your obedient servant,

Onondaga Academy, May 25, 1846. GEO. W. THOMSON.

From E. A. SMITH, *Esq., Cor. Secretary of Queen's Co. Teachers Association, N. Y.*

MR. THOMSON—Dear Sir—I recently received from your publishers a copy of the "Practical Arithmetic," of which you are the author. Permit me to express my gratification at the *internal evidence of merit* which it exhibits The lucid arrangement exceeds any thing of the kind that I have hitherto seen; the progression from simple easy examples to those which are more complex, and especially the illustrations of the different rules by examples drawn from the every day occurrences of life, are all exceedingly well adapted to impart a *real knowledge* of the science of Arithmetic, and are altogether preferable to the mechanical sameness, which has so long prevailed, and which will continue until the mere abstract expositions are laid aside. The juvenile mind needs tangible objects, familiar examples, which may be grasped without difficulty, and to which the process of reasoning may be successfully applied. Finally, I hope your book may come into general use, and I am satisfied that to be *appreciated* it has only to be seen and examined.

Very truly yours,

ELLIAN A. SMITH.

Hempstead, Jan. 31, 1846.

From A. D. STANLEY, *A. M., Professor of Mathematics in Yale College.*

From such an examination as I have been able to make of Thomson's "Practical Arithmetic," I cannot doubt that it will hold a high rank as an elementary work in our Academies and Schools. It will commend itself to teachers for the *clearness* and *precision* with which its rules and principles are stated, for the number and variety of examples it furnishes as exercises for the pupil, and especially for the *care* which the author has taken to present appropriate suggestions and observations wherever they are needed, to clear up any difficulties that are likely to embarrass the learner. In recommending the work as a class-book for pupils, it is not unimportant to state, that the author has himself had much experience in the business of instruction, and has thus had occasion to know where there was room for improvement in the elementary treatises in common use. Without such experience, no one can be qualified to prepare a class-book for schools. A. D. STANLEY.

Yale College, Dec. 1846.

From S. S. GREEN, *A. M., Principal of Philips' Grammar School, Boston, Mass.*

MR. THOMSON—DEAR SIR:—I hereby acknowledge the receipt of a copy of the "Practical Arithmetic," to which I have given sufficient attention to be convinced that it possesses superior merit as a text-book. I am particularly pleased with the practical character of it, the *systematic* and *natural* arrangements of its parts, the exactness of the definition, the clearness with which the principles are explained and illustrated, and the concise, yet explicit language with which the rules are stated. You have done a good service by removing from the tables of weights and measures all denominations out of use, and by introducing those adopted by the General Government. The work, in fine, is well adapted to the purposes of instruction. SAM'L S. GREEN.

Boston, Dec., 1846.

From I. G. HUBBS, A. M., *Principal of Washington Institute, New York*

GENTLEMEN,—I have carefully examined Mr. Thomson's "Practical Arithmetic;" and do most heartily add my testimonial to those already given in its favor. It is indeed a work of very great merit, comprising many excellencies in a small compass. Its value as a practical school book will be more apparent on a second and thorough examination. While as an elementary work it deserves a place in our best schools, *I know of no other so well adapted to general use.* ISAAC G. HUBBS.

New York, Aug. 1, 1846.

From the Teachers of the NORMAL SCHOOL *connected with the Public Schools of the City of New York.*

Thomson's "Practical Arithmetic" is an exceedingly well arranged book. The principles are stated with clearness and precision—the mode of reasoning is analytical and systematic, yet the character of the work is eminently practical, and well deserves the attention of teachers. We think it cannot fail to occupy a prominent place among the best text books upon this science now in use. JOSEPH M'KEEN, President of the New York State Teachers' Association, and Principal of Public School No. 5.

We heartily concur in the opinion expressed above.

DAVID PATTERSON, M. D., Principal of Public School No. 3.
WM. BELDEN, Principal of Public School No. 2.
LEONARD HAZLETINE, Principal of Public School No. 14.
ABM. K. VAN VLECK, Principal of Public School No. 18.

From WM. J. BELDEN, Jr., A. M., *Principal of Ward School No. 2, New York City.*

A careful examination of Prof. Thomson's "Practical Arithmetic," has satisfied me that it is a work of uncommon merit.

The language of the explanations and rules is peculiarly clear and intelligible, and the amount and value of this part of the work much superior to that of any other Arithmetic with which I am acquaimted. The number and gradually progressive character of the examples are also worthy of special notice.

New York, Sept. 9, 1846. WM. BELDEN, Jr.

I heartily concur in the above recommendation.

S. S. ST. JOHN, A. M., Principal of Ward School No. 10.

From SOLOMON JENNER, Esq., *Principal of the Commercial and Classical School, New York City.*

To the Public—Among the numerous treatises on the science of Arithmetic which I have carefully examined, I believe that Day & Thomson's is the best adapted to aid the teacher and facilitate the progress of the learner.

New York, 9th mo. 9th, 1846. SOLOMON JENNER.

From REV. L. COLEMAN, *A. M., Prof. of German, Princeton College, New Jersey.*

Thomson's "Practical Arithmetic" is a work of uncommon merit. In most treatises on this subject the rules are simply stated, with little or no explanation. The consequence is, that Arithmetic, to the ordinary scholar, is little else than a blind art, extremely unsatisfactory to every independent mind. But this work is a happy illustration of the inductive and synthetic mode of illustrating, even to the comprehension of a child, the principles of Arithmetic, before they are embodied in general rules. The clearness and precision of the rules, the completeness and variety of the examples which illustrate them, make the work "eminently practical" and satisfactory.

Princeton, N. J., Sept. 1846. LYMAN COLEMAN.

From I. B. COLLINS, Esq., *County Sup't. of Chenango Co., N. Y.*

MESSRS. J. C. DERBY & Co—I have examined Thomson's "Practical Arithmetic" and I deem it a work of uncommon merit. Avoiding many of the errors which exist in other works of the kind, it seems well calculated, by its excellent arrangement and familiar illustrations, to give the scholar thorough practical knowledge of the science of numbers. ISAAC B. COLLINS.

Smyrna, Feb. 16, 1847.

From J. DOUGLAS, A. B., *Teacher of Math., in Oxford Academy, N. Y.*

The examination that I have made of Thomson's "Practical Arithmetic" has resulted in the conviction, that for *clearness* in explanation of those abstruce principles and processes which so often perplex the scholar, and even embarass the teacher; and for *completeness* in fitting the learner for the practical duties of business-life, *this Arithmetic stands unrivaled.*

Oxford, Jan. 5, 1847. J. DOUGLASS.

From JOSEPH ATWATER, Esq., *County Sup't., Cortland Co., N. Y.*

DEAR SIR—I have examined Thomson's "Practical Arithmetic," and have no hesitation in pronouncing it superior to any thing of the kind, with which I am acquainted.

Respectfully, Yours, JOSEPH ATWATER.

Scott, Jan. 1847.

From the Hon. JUDGE BLACKMAN, A. M., *Chairman of the Board of School Visitors of the City of New Haven, Ct.*

James B. Thompson Esq.,—Dear Sir,—I have examined with attention your 'Practical Arithmetic," and consider it decidedly the best work for inculcating and illustrating the principles and practice of Arithmetic, which I have ever seen. Your illustrations, in the form of problems to be solved, are drawn, in a great measure, from the familiar scenes of early life; and while the young learner is *interested* in the solution of problems which he *feels* are practicable, he is encouraged to persevere in a study which would otherwise be dull and forbidding, and is thus imperceptibly led to acquire and understand the rules of arithmetic, which he now knows to be true.

I need hardly say, that the inductive method which you have adopted, is decidedly the most philosophical and intelligible mode of acquiring a knowledge of arithmetic; and as such I shall cheerfully recommend your work for general use in the schools of this city.

I remain dear sir, very respectfully yours, ALFRED BLACKMAN.
New Haven, Nov., 1845.

From MELLEN CHAMBERLAIN, *A. B., Principal of the Central School, Brattleboro, Vt.*

MR. J. B. THOMSON—DEAR SIR:—After a thorough examination of your "Practical Arithmetic," I am prepared to recommend it to teachers and committee-men, as the best text book within my acquaintance, for the use of common schools. Yours, truly, MELLEN CHAMBERLAIN.
Brattleboro, Vt. Oct. 20, 1846.

From REV. W. M. GUILFORD, *Principal of Perkinsville Academy, Vt.*

J. B. Thompson, Esq.—Dear Sir: Having used your "Practical Arithmetic" in our Academy, I can speak from experience of its *superior* value. Its philosophical arrangement—its perfect clearness of illustration, and its *adaptation* to the common business of life, must bring it into favor with every Teacher who will examine it thoroughly. Your sections on the "Properties of Numbers" and "Analysis," are well worth the price of the book.
Perkinsville, Sept. 1846. W. M. GUILFORD.
I heartily concur in the above recommendation.
H. L. S. HASKELL, Ass't. Teacher.

From M. WEED, A. B., *Teacher of Languages, Hamilton, N. Y.*

I have just finished the examination of your "Practical Arithmetic." *It is a most excellent book*—superior in my eye to any other school Arithmetic extant. I was delighted with its perusal. *Its preface, the hints on the mode of teaching arithmetic, and the suggestions*, plainly convinced me that the author not only understands his subject, but knows *how to present* it to others.—I am highly pleased with the *order of the subjects*, with the combination of mental exercises and exercises for the slate, with the information found in the tables of compound numbers, and the full development of the principles of cancellation.—Hamilton, Jan. 1847. M. WEED.

Thomson's First Lessons.

MENTAL ARITHMETIC,

OR

FIRST LESSONS IN NUMBERS.

FOR CHILDREN.

By JAMES B. THOMSON, A. M.,

AUTHOR OF PRACTICAL ARITHMETIC, EDITOR OF DAY'S SCHOOL ALGEBRA, LEGENDRE'S GEOMETRY ETC.

THIRTY-FIFTH EDITION, REVISED AND ENLARGED.

AUBURN:
J. C. DERBY & CO.;
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199 BROADWAY.

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216 WILLIAM STREET, NEW YORK.

J. D. BEDFORD, PRINTER, 138 FULTON ST.

PREFACE.

At what precise age a child should begin to go to school, or commence the different studies, it is not our province to decide. Whatever may be the diversity of opinion on this point, all practical teachers seem to agree, that *Mental Arithmetic* is among the first exercises which should be presented to the youthful mind. The correctness of this sentiment is corroborated by the ease with which children understand simple combinations of numbers, their fondness for these exercises, and the obvious advantages which may be derived from them. But in order to become interesting or profitable, it is manifest, this branch, as well as others, must be taught in such a manner that the pupil shall *understand* it. The examples, therefore, must, at first, be simple, containing small numbers, and have reference to sensible objects with which the learner is acquainted; the transition from easy to more difficult questions must be *gradual;* and the *reason* for every step in the solution distinctly seen.

It is believed that much *dislike* for the study of Arithmetic, and much *unnecessary discouragement*, have been occasioned by the *abruptness* of the transitions from *easy* to *difficult* questions. It is too often forgotten that the powers of the child's mind, like those of his body, are feeble; that while familiar mental exercises which he can comprehend, afford him the highest delight, he turns from intricate questions, which he does not and cannot understand, with indifference and disgust.

It is the design of this little work to furnish a series of mental exercises in numbers, adapted to the wants and capacities of children. It commences with *practical examples*, which relate to familiar objects and require the

simplest combinations. The pupil is then introduced to others involving the same principle but somewhat harder, special care being taken to make the transition *very gradual*, so that instead of being disheartened at the ruggedness of the way, he shall be stimulated to take the next step by the hope of victory.

From the fact that children comprehend and remember *words* more easily than *figures*, and reason upon them with so much greater facility, the numbers and Tables in the first part of the book are expressed in words.

After the pupil has become practically acquainted with the principles of a rule, and is able to solve questions under it with facility, the operation is then defined, and the more prominent terms are briefly explained. This, it is believed, teachers will be glad to see. There is no reason why a child should not be informed, that a certain operation upon numbers is called Addition; another Subtraction; &c., as well as to be told that a certain operation of his vocal organs in connection with those of his mind, is called reading; another singing; &c.

With this brief explanation of the object and plan of the work, the author commends it to the friends of education, by whom his former efforts to subserve this noble cause, have been so favorably received.

Although designed particularly as an introduction to the "Practical Arithmetic," it may be used as a preparatory work to any of the larger systems of Arithmetic now before the public.

MENTAL ARITHMETIC.

SECTION I.

INTRODUCTION.

The first step in acquiring a knowledge of numbers is to learn to *count*. Most children are able to repeat the *names* of numbers, *one*, *two*, *three*, &c., before they begin to go to school; but there are fewer who fully *comprehend* the *meaning* of these terms; who perceive, for example, that *eleven* expresses *more* things than *seven*, or *fewer* than *thirteen*. While such is the case, no substantial progress can be made in Arithmetic.

Great pains should therefore be taken to show young pupils, in the outset, *how many* things the name of each number denotes, and to establish in their minds a correct idea of *more* and *less*. Counters, made of round pieces of wood or leather, also beans, kernels of corn, &c., may be used for this purpose; but the most convenient apparatus is the *Numerical Frame*.* The balls upon the wires are more easily arranged and are seen at once by every member of the class, while the liability of falling upon the floor and getting lost, is entirely avoided.

LESSON I.

Having slipped all the balls to the left side, the teacher holds up the Numerical Frame before the class and requests their particular attention.

* Every instructor who is called upon to teach the rudiments of *Arithmetic*, should be furnished with this useful instrument. It

With his pointer he now moves the first ball on the bottom wire to the right side and says, this is *one*, the class repeating it with him. Moving across another on the same wire, he says, this makes *two*, the class repeating it with him as before; moving another, this makes *three;* another still, this makes *four;* and yet another, this makes *five;* and so on up to *ten*.

This process should be repeated and varied according to circumstances, until the class can count *ten* in concert and individually with readiness. If this cannot be accomplished in one exercise, another should be devoted to it.

Note.—If the children are young, or have never learned the names of any of the numbers, when they get to *three* or *five* it will be expedient to stop and review as far as they have been. Care should be taken not to present too many new ideas to the young mind at once, lest it become bewildered; nor should the exercise be continued so long as to *weary* it, and thus create a *lasting dislish* for the study.

LESSON II.

Slipping all the balls to the left side of the frame as before, move the first on the lower wire to the right side, and ask the class to count it.

Now move out *two* on the second wire, taking one at a time, and let the class count as you move them, *one, two*. Then pass across *three* on the third wire, taking one at a time, while the class count *one, two, three*.

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costs but a trifle, and, with proper care, will last an age. Its more important uses will be pointed out in their proper place.

The lessons in this Section are designed for pupils who have not learned to count, or may not comprehend *how many things* are denoted by the names of numbers. Those who thoroughly understand these points, can begin with Addition.

Proceed in this manner to the *tenth* or *last*, increasing one ball on each successive wire.

Again, beginning at the bottom, let the class count the balls moved out on each wire, and observe that *two* is one more than *one;* that *three* is one more than *two;* that *four* is one more than *three*, &c.

Next, let the class retrace this process; that is, beginning at the top, let them count the balls moved out on each wire till they arrive at the bottom one.

Let them also begin at ten and count *backwards* to one, several times in quick succession. Thus, *ten, nine, eight, seven, six*, &c.

Finally, move out any number of balls under ten promiscuously, and call upon some one to count them; then move out a different number, and let another count them; and thus continue to vary the exercise, till every one in the class can count *ten* understandingly.

LESSON III.

Note.—As soon as the class clearly comprehend *how many* things are expressed by the name of each of the numbers up to *ten*, they are then prepared to learn to count from *ten* to *twenty*, &c.

Having counted out *ten* balls on the lower wire, move across one on the second wire saying, this makes *eleven*, the class repeating it with you. Passing across another, this makes *twelve;* another, this makes *thirteen;* another still, this makes *fourteen;* and so on up to *twenty*.

Repeat this process, at the same time explaining to the class that the term *thirteen*, is composed of the words *three* and *ten*, and means the same as *three* counted on to *ten*, or *three* and *ten* put together. Also, that the term *fourteen* is composed of the

words *four* and *ten*, and means the same as *four* and *ten* put together; that *fifteen* means *five* and *ten*; *sixteen*, *six* and *ten*; *seventeen*, *seven* and *ten*; *eighteen*, *eight* and *ten*; *nineteen*, *nine* and *ten*; and *twenty* means *two tens*.

Next, having counted off twenty balls; that is, ten apiece on each of the two lower wires, passing across one on the next wire, saying this makes *twenty-one*, the class repeating it with you as before. Passing across another, this makes *twenty-two*; another, this makes *twenty-three*; another still, this makes *twenty-four*; and so on to *thirty*.

Here again the teacher should be careful to explain that the term *twenty-one* is composed of the words *twenty* and *one*, and means the same as *one* counted on to *twenty*, or *twenty* and *one* put together. Also, that the term *twenty-two* is composed of the words *twenty* and *two*, and means the same as *twenty* and *two* put together; that *twenty three* means *twenty* and *three*; &c.

In a similar manner children may be easily taught to count from thirty to forty, fifty, sixty, &c., to a hundred, and to comprehend *how many* things are expressed by the name of each number.

SECTION II.

ADDITION.

LESSON I.

1. How many little *boys* are there in this class?

2. How many little *girls* are there?

3. How many little girls and boys are there, counted together?

4. Will each of you show me your *right* hand? Now if you put your *left* hand by the side of it, how many hands will each one show me? Why?

Ans. Because *one* and *one* more make *two*.

5. If you show me *two* fingers on your left hand and *one* on your right, how many fingers will you show me? Why?

Ans. Because *two* and *one* more make *three*.

6. If you open *three* fingers on your left hand and *one* on your right, how many fingers will you have open? Why?

7. How many *fingers* have you on your right hand? How many *thumbs*? How many *fingers* and *thumbs* counted together, are there on your right hand?

8. If I move out *five* balls on the lower wire of my Numerical Frame and *one* on the next, how many will they all make? Why?

Note.—When a general question is asked which is not designed to be answered in concert, it is an excellent way to have all who think they know, raise a hand; then call upon some one promiscuously to answer it. This method prevents much confusion and secures the attention, while it effectually avoids the temptation to learn the answers to certain questions which will fall to each, if the teacher always begins at the same end of the class and *proceeds through* it in regular rotation.

9. If I move out *six* on the lower wire and *one* on the next, how many will they make? Why?

10. If I move out *seven* on the lower and *one* on the next, how many will they make? Why?

11. If I move out *eight* on the lower and *one* on the next, how many will they make?

12. If I move out *nine* on the lower and *one* on the next, how many will they make?

Note.—As soon as a child learns a principle in Arithmetic, it is important for him to see its application, and begin to practice it. For this reason, it is recommended to let the class study the next eight lessons in connection with the corresponding parts of the Table below. Thus, as soon as they learn to add *twos*, let them take lesson *second* which contains exercises in adding two; as soon as they learn to add *threes*, let them take lesson *third*, &c. In this way the Table is kept together, which is essential for reference and review, and at the same time we secure all the advantages of studying it in connection with examples which put it into practice, as fast as it is learned.

ADDITION TABLE.

One	and	one	are	two.	One	and six	are seven.
One	"	two	"	three.	One	" seven	" eight.
One	"	three	"	four.	One	" eight	" nine.
One	"	four	"	five.	One	" nine	" ten.
One	"	five	"	six.	One	" ten	" eleven.
Two	and	one	are	three.	Two	and six	are eight.
Two	"	two	"	four.	Two	" seven	" nine.
Two	"	three	"	five.	Two	" eight	" ten.
Two	"	four	"	six.	Two	" nine	" eleven.
Two	"	five	"	seven.	Two	" ten	" twelve.
Three	and	one	are	four.	Three	and six	are nine.
Three	"	two	"	five.	Three	" seven	" ten.
Three	"	three	"	six.	Three	" eight	" eleven.
Three	"	four	"	seven.	Three	" nine	" twelve.
Three	"	five	"	eight.	Three	" ten	" thirteen.

Four	and	one	are five.	Four	and	six	are ten.
Four	"	two	" six.	Four	"	seven	" eleven.
Four	"	three	" seven.	Four	"	eight	" twelve.
Four	"	four	" eight.	Four	"	nine	" thirteen.
Four	"	five	" nine.	Four	"	ten	" fourteen.
Five	and	one	are six.	Five	and	six	are eleven.
Five	"	two	" seven.	Five	"	seven	" twelve.
Five	"	three	" eight.	Five	"	eight	" thirteen.
Five	"	four	" nine.	Five	"	nine	" fourteen.
Five	"	five	" ten.	Five	"	ten	" fifteen.
Six	and	one	are seven.	Six	and	six	are twelve.
Six	"	two	" eight.	Six	"	seven	" thirteen.
Six	"	three	" nine.	Six	"	eight	" fourteen.
Six	"	four	" ten.	Six	"	nine	" fifteen.
Six	"	five	" eleven.	Six	"	ten	" sixteen.
Seven	and	one	are eight.	Seven	and	six	are thirteen.
Seven	"	two	" nine.	Seven	"	seven	" fourteen.
Seven	"	three	" ten.	Seven	"	eight	" fifteen.
Seven	"	four	" eleven.	Seven	"	nine	" sixteen.
Seven	"	five	" twelve.	Seven	"	ten	" seventeen.
Eight	and	one	are nine.	Eight	and	six	are fourteen.
Eight	"	two	" ten.	Eight	"	seven	" fifteen.
Eight	"	three	" eleven.	Eight	"	eight	" sixteen.
Eight	"	four	" twelve.	Eight	"	nine	" seventeen.
Eight	"	five	" thirteen.	Eight	"	ten	" eighteen.
Nine	and	one	are ten.	Nine	and	six	are fifteen.
Nine	"	two	" eleven.	Nine	"	seven	" sixteen.
Nine	"	three	" twelve.	Nine	"	eight	" seventeen.
Nine	"	four	" thirteen.	Nine	"	nine	" eighteen.
Nine	"	five	" fourteen.	Nine	"	ten	" nineteen.

LESSON II.

1. If a pear costs *two* cents, and an apple costs *one* cent, how many cents will they both cost? Why?

2. Charles had *two* books, and his father gave him *two* more: how many books did he then have?—Why?

3. Robert brought in *three* sticks of wood, and George *two* sticks: how many sticks did both boys bring in? Why?

4. Let each one in the class open *all* his fingers on his left hand, and *two* on his right: how many fingers has each one open? How many are *four* and *two*?

5. Sarah had *five* dresses, and on her birthday her aunt gave her *two* more: how many dresses had she then? Why?

6. In this class there are *two* girls, and *six* boys: how many scholars does the class contain?

7. John has *seven* brothers, and *two* sisters: how many brothers and sisters has he together?

8. A little boy gave a blind man *eight* cents, and his sister gave him *two* cents more: how many cents did they both give him?

9. William has *two* marbles in his hand, and *nine* in his pocket: how many marbles has he in all?

10. Mary recited *two* perfect lessons last week and

Note.—The process of adding and the structure of the Table may be easily illustrated by the Numerical Frame. Thus, to shew that five and four make nine, move out five balls on one wire and four on another, and let the pupil count them together. But as soon as the pupil *understands the principle* of the operation, he should then learn to perform it without the assistance of visible objects. Nothing is more *deleterious* to mental growth and discipline, than the *habit* of solving questions by counters, by the fingers, marks upon a slate, &c. &c.

ten this week: how many perfect lessons has she recited in two weeks?

LESSON III.

1. If you pay *three* cents for a pint of nuts, and *one* cent for an apple, how many cents do you pay for both? Why?

2. Henry has *three* young doves, and *two* old ones: how many doves has he? Why?

3. A beggar met some generous little boys, one of whom gave him *four* cents, and another gave him *three* cents: how many cents did they both give him? Why?

4. Susan bought *three* yards of blue ribbon, and *three* yards of white: how many yards of ribbon did she buy in all? Why?

5. Harriet gave her teacher *five* pinks, and *three* roses: how many flowers did she give her teacher?

6. Matthew sold a quart of chestnuts for *six* cents, and a pint of beechnuts for *three* cents: how much did his nuts come to?

7. Henry picked *three* ripe peaches from one tree, and *seven* from another: how many peaches did he pick from both trees?

8. Frank has *nine* walnuts in his pocket, and he lost *three* coming to school: how many had he when he started from home?

9. How many are *eight* and *three*?

10. Jane read *ten* pages of history in the morning, and *three* in the afternoon: how many pages did she read during the day?

Note.—It is advisable to have the class review the preceding part of the Table, and thus continue to do at every recitation, till they get through it.

LESSON IV.

1. Joseph received *four* peaches from his cousin, and *one* from his sister: how many peaches had he?

2. A boy paid *four* cents for an orange and *two* cents for a pear: how much did he pay for both?

3. Emily bought a yard of silk for *five* shillings, and a pair of gloves for *four* shillings: how many shillings did she pay for both?

4. Dick's father gave him *six* marbles, and he gained *four* more: how many had he then?

5. Henry gave *four* cents for a lemon, and *four* cents for an orange: how many cents did he give for both?

6. A farmer gave *four* dollars for a hog, and *eight* dollars for a cow: how much did he pay for both?

7. How many are *four* and *three?*

8. A market boy sold *four* shillings worth of milk, and vegetables to the amount of *seven* shillings: how much money did he have to carry home?

9. James gave *four* shillings for a knife, and *nine* shillings for a pair of skates: what did he pay for both?

10. Henrietta bought a slate for *ten* cents, and a sponge for *four* cents: how much did she pay for both?

LESSON V.

1. A man bought a plough for *five* dollars, and a shovel for *two* dollars: how many dollars did he pay for both?

2. A farmer raised *three* bushels of plums on one tree, and *five* bushels on another: how many bushels did he raise on both trees?

3. A man sold a bushel of plums for *five* dollars, and a bushel of peaches for *four* dollars: how much did both come to?

4. There are *six* sweet apples, and *five* sour ones in the fruit dish: how many apples does the dish contain?

5. A man paid *five* shillings for a turkey, and *five* shillings for a peck of peas: how much did he pay for both?

6. A man caught *eight* red squirrels, and *five* grey ones: how many did he catch in all?

7. A cabinet-maker asks *five* dollars for a rocking chair, and *seven* dollars for a table: what is the price of both?

8. If I pay *five* shillings postage on letters, and *nine* shillings on pamphlets, what is the amount of my postage?

9. Harriet bought a comb for *ten* cents, and a paper of needles for *five* cents: how much did she pay for both?

LESSON VI.

1. Charlotte picked *six* white roses, and *two* red ones: how many roses did she pick?

2. Harriet gave *three* cents for a sponge, and *six* cents for a slate: how many cents did she pay for both?

3. How many are *six* and *six*?

4. How many are *six* and *five*?

5. How many are *six* and *four*?

6. If you read *six* pages in the morning, and *seven* in the evening, how many pages will you read in a day?

7. John hoed *eight* rows of corn in one day, and *six* in another day: how many rows did he hoe in both days?

8. His employer gave him *nine* pence for his first day's work, and *six* pence for the second day's work: how many pence did John receive?

9. A lady bought a muff for *ten* dollars, and a hat for *six* dollars: what was the amount of her bill?

LESSON VII.

1. Sarah had *seven* pins on her cushion, and she afterwards found *two* more: how many pins had she then?

2. How many are *seven* and *three?*

3. If *seven* flower pots stand in one window, and *four* in another, how many are there in both windows?

4. How many are *seven* and *six?*

5. How many are *seven* and *five?*

6. How many are *seven* and *seven?*

7. Oliver paid *seven* cents for a writing-book, and *eight* cents for a slate: how much did he pay for both?

8. How many are *seven* and *ten?*

9. How many are *seven* and *nine?*

LESSON VIII.

1. If a barrel of flour cost *eight* dollars, and a keg of lard *two* dollars, how much will both cost?

2. A merchant tailor asks *eight* dollars for a pair of pants, and *three* dollars for a vest: what is the price of both?

3. If you pay *eight* cents a mile for the use of a horse, and *five* cents for a buggy, how much will you pay a mile for both?

4. How many are *eight* and *four?*

5. Julius gave one of his companions *six* apples, and had *eight* left: how many had he at first?

6. Henry had *eight* marbles, and his brother gave him *eight* more: how many did he then have?

7. A shopkeeper sold *eight* yards of satin to one lady, and *seven* to another: how many yards did he sell to both?

8. Catharine's book has *eight* pictures in it, and Mary's has *nine:* how many pictures do both books contain?

9. If you pay *eight* cents for a pound of sugar, and *ten* cents for a pound of figs, what must you pay for both?

LESSON IX.

1. There are *nine* shade trees standing in front of the school house, and *two* have been cut down: how many trees were set out?

2. Alexander's kite line is now *nine* yards long, by accident he broke off *three* yards: how long was his line at first?

3. How many are *nine* and *five?*

4. How many are *nine* and *four?*

5. If a ton of coal costs *nine* dollars, and a cord of wood costs *six* dollars, how much will they both cost?

6. A hunter gave *nine* dollars for a gun, and seven dollars for a dog: how much did he pay for both?

words *four* and *ten*, and means the same as *four* and *ten* put together; that *fifteen* means *five* and *ten*; *sixteen*, *six* and *ten*; *seventeen*, *seven* and *ten*; *eighteen*, *eight* and *ten*; *nineteen*, *nine* and *ten*; and *twenty* means *two tens*.

Next, having counted off twenty balls; that is, ten apiece on each of the two lower wires, passing across one on the next wire, saying this makes *twenty-one*, the class repeating it with you as before. Passing across another, this makes *twenty-two*; another, this makes *twenty-three*; another still, this makes *twenty-four*; and so on to *thirty*.

Here again the teacher should be careful to explain that the term *twenty-one* is composed of the words *twenty* and *one*, and means the same as *one* counted on to *twenty*, or *twenty* and *one* put together. Also, that the term *twenty-two* is composed of the words *twenty* and *two*, and means the same as *twenty* and *two* put together; that *twenty three* means *twenty* and *three*; &c.

In a similar manner children may be easily taught to count from thirty to forty, fifty, sixty, &c., to a hundred, and to comprehend *how many* things are expressed by the name of each number.

SECTION II.

ADDITION.

LESSON I.

1. How many little *boys* are there in this class?

2. How many little *girls* are there?

3. How many little girls and boys are there, counted together?

4. Will each of you show me your *right* hand? Now if you put your *left* hand by the side of it, how many hands will each one show me? Why?

Ans. Because *one* and *one* more make *two.*

5. If you show me *two* fingers on your left hand and *one* on your right, how many fingers will you show me? Why?

Ans. Because *two* and *one* more make *three.*

6. If you open *three* fingers on your left hand and *one* on your right, how many fingers will you have open? Why?

7. How many *fingers* have you on your right hand? How many *thumbs*? How many *fingers* and *thumbs* counted together, are there on your right hand?

8. If I move out *five* balls on the lower wire of my Numerical Frame and *one* on the next, how many will they all make? Why?

Note.—When a general question is asked which is not designed to be answered in concert, it is an excellent way to have all who think they know, raise a hand; then call upon some one promiscuously to answer it. This method prevents much confusion and secures the attention, while it effectually avoids the temptation to learn the answers to certain questions which will fall to each, if the teacher always begins at the same end of the class and proceeds through it in regular rotation.

words *four* and *ten*, and means the same as *four* and *ten* put together; that *fifteen* means *five* and *ten*; *sixteen*, *six* and *ten*; *seventeen*, *seven* and *ten*; *eighteen*, *eight* and *ten*; *nineteen*, *nine* and *ten*; and *twenty* means *two tens*.

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Ans. Because *one* and *one* more make *two*.

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Ans. Because *two* and *one* more make *three*.

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7. How many *fingers* have you on your right hand? How many *thumbs*? How many *fingers* and *thumbs* counted together, are there on your right hand?

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LESSON XIII.

1. *Q.* In what does the solution of the preceding examples in this section, consist?

Ans. It consists in *uniting two* or *more numbers* together.

2. *Q.* What is the process of uniting two or more numbers together, called?

Ans. It is called ADDITION.

3. *Q.* When we add two or more numbers together, what is the number which we obtain, called?

Ans. The SUM or AMOUNT.

4. *Q.* When we say *five* and *four* are *nine;* which of these numbers is the *sum* or *amount?*

Ans. The number *nine.*

5. *Q.* What is the sum of six, and four, and two?

Solution.—Six and four are ten, and two are twelve. *Ans.* Twelve.

6. What is the sum of five, and three, and one?

7. What is the sum of eight, and four, and three?

8. What is the sum of ten, and fifteen, and two?

9. What is the sum of twenty, and six, and four?

10. What is the sum of thirty-one, and ten, and six, and one, and four?

11. What is the sum of twenty-seven, and three, and one, and six, and five?

12. What is the sum of forty-three, and four, and ten, and six, and seven?

13. What is the sum of fifty-four, and five, and nine, and three, and six?

14. What is the sum of seventy-two, and three, and five, and seven, and eight?

15. What is the sum of sixty-eight, and ten, and two, and five, and three, and nine?

EXAMPLES FOR PRACTICE.

Note.—The examples for practice may be divided into two or more lessons according to the capacity of the learner.

1. It cost a traveler ten shillings a day for his board, seven shillings for his horse, and three shillings for incidental expenses: how much were his daily expenses?

2. If one little girl should give me seven roses, another five tulips, and another four pinks, how many flowers should I have?

3. How many are three, and seventeen, and four?

4. How many are sixteen, and four, and five?

5. How many are eighteen, and four, and two?

6. A man bought a pound of sugar for ten cents, a pound of raisins for eight cents, and a pound of butter for six cents: what was the cost of all?

7. Henry bought a quart of cherries for eight cents, an orange for three cents, and an ounce of peppermints for six cents: how much did he pay for all?

8. Five, and three, and seventeen, and one, are how many?

9. Sixteen, and two, and seven, and three, are how many?

10. Three, and nineteen, and seven, and two, are how many?

11. Harry bought a pound of raisins for ten cents, a pound of figs for fifteen cents, and an orange for five cents: what did they all amount to?

12. Louisa gave twenty cents for her slate, ten cents for her writing-book, six cents for a bunch of

quills, and three cents for some pencils: what did she pay for all?

13. How many are four, and five, and one? Six, and seven, and three? Three, and eight, and four? Six, and ten, and five? Ten, and eight, and three?

14. How many are eight, and two, and four? Six, and one, and two? Seven, and four, and ten? Nine, and ten, and five?

15. A farmer sold a cow for eleven dollars, a calf for four dollars, and a sheep for three dollars: how much did he receive for all?

16. A gentleman had several apple-trees in his garden; from one he gathered seven bushels, from another ten, and from another five bushels: how many bushels did he gather from all?

17. Dick bought a knife for twenty-five cents, and sold it for five cents more than he gave for it: how much did he sell it for?

18. A man bought a sleigh for thirty dollars, and paid seven dollars to have it painted, and ten dollars for other repairs: how much did it cost him?

19. A farmer bought a cart for thirty-five dollars, a plough for nine dollars, and a shovel for two dollars: what was the cost of the whole?

20. A man bought a horse for sixty dollars, a saddle for ten dollars, and a bridle for three dollars: how much did he pay for all?

21. William bought a Geography for seventy-five cents, a slate for ten cents, a sponge for three cents, and a lead pencil for two cents: what was the amount of his purchase?

22. A farmer sold a horse and saddle for a hundred and twenty-five dollars, which was ten dollars less than they cost him: what did he pay for them?

SECTION III.

SUBTRACTION.

LESSON I.

1. Suppose I have *two* peaches, if I give away *one* of them, how many shall I have left?

Solution.—One peach taken from two peaches, leaves one. *Ans.* One peach.

2. Open *three* fingers on your left hand; now if you shut *one* of them, how many will remain open? *One* taken from three leaves how many?

3. George having *four* marbles in his hand, dropped *one* of them: how many were left in his hand?

Note.—The principle of subtracting one number from another, may be easily explained to the pupil by the Numerical Frame. Thus, to show *how many three* taken from *eight* will leave, move across eight balls, then moving three of them part way back, let the pupil count those that are left.

4. Leonard had *five* cents and gave *one* for a pencil: how many cents has he left? One from five leaves how many?

5. Cornelia had *six* apples and gave *one* to her brother: how many had she left?

6. There are *seven* scholars belonging to this class; yesterday *one* of them was absent: how many were present?

7. Martha had *eight* roses, but on her way to school she lost *one:* how many had she left?

8. If you have *ten* apples, and give away *one* of them, how many will you have left?

SUBTRACTION TABLE.

Note.—It is advisable for the pupil to study this Table in the same manner as he did the Addition Table. (*See Note, p.* 10.)

One	from	one	leaves	naught.	One	from	six	leaves	five.
One	"	two	"	one.	One	"	seven	"	six.
One	"	three	"	two.	One	"	eight	"	seven.
One	"	four	"	three.	One	"	nine	"	eight.
One	"	five	"	four.	One	"	ten	"	nine.
Two	from	two	leaves	naught.	Two	from	seven	leaves	five.
Two	"	three	"	one.	Two	"	eight	"	six.
Two	"	four	"	two.	Two	"	nine	"	seven.
Two	"	five	"	three.	Two	"	ten	"	eight.
Two	"	six	"	four.	Two	"	eleven	"	nine.
Three	from	three	leaves	naught.	Three	from	eight	leaves	five.
Three	"	four	"	one.	Three	"	nine	"	six.
Three	"	five	"	two.	Three	"	ten	"	seven.
Three	"	six	"	three.	Three	"	eleven	"	eight.
Three	"	seven	"	four.	Three	"	twelve	"	nine.
Four	from	four	leaves	naught.	Four	from	nine	leaves	five.
Four	"	five	"	one.	Four	"	ten	"	six.
Four	"	six	"	two.	Four	"	eleven	"	seven.
Four	"	seven	"	three.	Four	"	twelve	"	eight.
Four	"	eight	"	four.	Four	"	thirteen	"	nine.
Five	from	five	leaves	naught.	Five	from	ten	leaves	five.
Five	"	six	"	one.	Five	"	eleven	"	six.
Five	"	seven	"	two.	Five	"	twelve	"	seven.
Five	"	eight	"	three.	Five	"	thirteen	"	eight.
Five	"	nine	"	four.	Five	"	fourteen	"	nine.
Six	from	six	leaves	naught.	Six	from	eleven	leaves	five.
Six	"	seven	"	one.	Six	"	twelve	"	six.
Six	"	eight	"	two.	Six	"	thirteen	"	seven.
Six	"	nine	"	three.	Six	"	fourteen	"	eight.
Six	"	ten	"	four.	Six	"	fifteen	"	nine.

Seven	from	seven	leaves	naught.	Seven	from	twelve	leaves	five.
Seven	"	eight	"	one.	Seven	"	thirteen	"	six.
Seven	"	nine	"	two.	Seven	"	fourteen	"	seven.
Seven	"	ten	"	three.	Seven	"	fifteen	"	eight.
Seven	"	eleven	"	four.	Seven	"	sixteen	"	nine.
Eight	from	eight	leaves	naught.	Eight	from	thirteen	leaves	five.
Eight	"	nine	"	one.	Eight	"	fourteen	"	six.
Eight	"	ten	"	two.	Eight	"	fifteen	"	seven.
Eight	"	eleven	"	three.	Eight	"	sixteen	"	eight.
Eight	"	twelve	"	four.	Eight	"	seventeen	"	nine.
Nine	from	nine	leaves	naught.	Nine	from	fourteen	leaves	five.
Nine	"	ten	"	one.	Nine	"	fifteen	"	six.
Nine	"	eleven	"	two.	Nine	"	sixteen	"	seven.
Nine	"	twelve	"	three.	Nine	"	seventeen	"	eight.
Nine	"	thirteen	"	four.	Nine	"	eighteen	"	nine.

LESSON II.

1. William had two apples when he started from home, and has given two away: how many has he now? Two from two leaves how many?

2. Eliza had four cents, and has spent two of them for candy: how many cents has she left?

Note.—The pupil should think what number added to two makes four, and that will be the number of cents she now has.

3. There were three doves upon the roof of a barn, but two of them have flown away: how many remain upon the roof? Two from three leaves how many? One from three leaves how many?

4. Marbles were formerly five cents a dozen, but now they are two cents cheaper: what do they now cost a dozen? Two and what number make five? Three from five leaves how many?

5. Joseph having seven cents, gave two of them

for a peach: how many cents had he left? Two and what number make seven? Five from seven leaves how many?

6. A boy bought six tumblers, and broke two of them in carrying them home: how many whole ones were left? Two and what number make six? Four from six leaves how many?

7. Formerly there were nine shade trees in front of the school house, but two have been cut down: how many remain?

8. There are eight scholars in the Geography class; two of them missing their lesson, were detained: how many were permitted to take their seats?

9. A boy having ten rabbits, lost two of them: how many had he left? Two and what number make ten? Eight from ten leaves how many?

LESSON III.

1. Edwin had three oranges, and gave each of his three sisters one apiece: how many had he left? Three from three leaves how many?

2. If Edwin had four oranges, and should give away three, how many would he have left? Three from four leaves how many?

3. A boy was sent to buy six eggs, by carelessness he broke three of them: how many whole ones had he left? Three and what number make six?

4. A man put five cows in a pasture, but three of them jumped out: how many remained in the *pasture?*

5. *Louisa* having seven shillings, gave three of

them for a pair of gloves: how many shillings had she then?

6. Frank had nine chickens, but three of them were killed by the hawks: how many had he left?

7. Eight boys were permitted to go out, but only three of them chose to go: how many staid in school?

8. Eleven boys were called up to be punished for bad conduct, all but three of them confessed and were pardoned: how many escaped the punishment?

9. Julia finding ten roses on her bush, picked off three: how many remained on the bush?

10. There were twelve peaches in a fruit basket, three of which had begun to decay: how many sound ones were there?

LESSON IV.

1. Joseph having five lemons, gave four of them for a knife: how many had he left?

2. There were seven chairs in a school room, four of which were broken: how many whole ones were there?

3. Mary having six pears, gave four of them to her brothers: how many had she left?

4. On a training day, nine boys formed themselves into a military company, four of them were officers and the remainder were privates: how many privates were there?

5. John made eight marks on his slate, and then rubbed out four of them: how many marks remained?

6. A pound of sugar is worth ten cents, and a

quart of vinegar is worth four cents: how much more is the sugar worth than the vinegar?

7. Lucretia had twelve flower pots standing in the window, and four of them fell out: how many remained in the window?

8. Edward exchanged his kite worth eleven cents for an inkstand worth four cents, and received the balance in money: how much money did he receive?

9. William gave thirteen cents for a slate, and four cents for a sponge: how much more did his slate cost than his sponge?

10. There are fourteen pages in Henrietta's writing-book, and she has written four of them: how many pages remain to be written?

LESSON V.

1. If an orange costs six cents, and a lemon costs five cents, how much more does an orange cost than a lemon?

2. A man having bought eight yards of cloth, used five yards to make a suit of clothes: how many yards had he left?

3. Frank has seven marbles, and John has five: how many more marbles has Frank than John?

4. A man bought a cow for ten dollars, and gave a barrel of flour worth five dollars, and paid the rest in money: how much money did he pay?

5. If a bushel of wheat costs nine shillings, and a bushel of corn five shillings, what is the difference in their price?

6. A man bought a quantity of butter for twelve *dollars, but* finding it damaged, sold it for five dol-

lars less than he gave for it: for how much did he sell it?

7. If you had eleven dollars and should pay five dollars for a hat, how many dollars would you have left?

8. John answered thirteen questions and Peter only five: how many more questions did John answer than Peter?

9. A trader bought a keg of tobacco for fourteen dollars, and sold it for five dollars less than he gave: how much did he sell it for?

LESSON VI.

1. There were seven passengers in a stage, six of whom got out: how many were left in the stage?

2. George bought nine quills, and used up six of them in a week: how many had he left?

3. A boy having eight cents, bought six cents worth of figs: how many cents had he left?

4. Jane having eleven walnuts, cracked six of them: how many whole ones has she?

5. Moses sold his knife for ten cents, which was six cents more than he gave for it: how much did it cost him?

6. A writing-book costs thirteen cents, and an inkstand six cents: how much more must I pay for a writing-book than an inkstand?

7. Harriet bought twelve knots of yarn, and used six knots in knitting herself a pair of stockings: how many knots had she left?

8. During the last fourteen days it has rained six days: how many fair days have there been? Eight *from fourteen* leaves how many?

9. A watermelon costs fifteen cents, and a muskmelon six cents: what is the difference in their prices?

LESSON VII.

1. Sarah had eight pins, but she has lost seven of them: how many has she left?

2. Catharine having a present of nine peaches, gave away seven of them, and kept the remainder: how many did she keep?

3. Seven from eleven leaves how many? Four from eleven leaves how many?

4. A merchant had ten yards of cloth in a piece, and sold seven yards of it: how many yards were left?

5. If you had twelve apples and should give away seven of them, how many would you have left?

6. John had thirteen marbles and lost seven of them at play: how many had he left?

7. A farmer drove fourteen sheep to market, but could sell only seven of them: how many had he left?

8. Seven from sixteen leaves how many? Nine from sixteen leaves how many?

9. A man bought a keg of molasses containing fifteen gallons, and having used a quantity of it, found he had seven gallons left: how much had he used?

10. There were seventeen caps hung up in the entry, but during recess seven of them were knocked *down*: how many of them were left hanging? Ten *from seventeen* leaves how many?

LESSON VIII.

1. Frank bought a book for eight cents, and sold it for eleven cents: how much did he make by his bargain?

2. A lady bought a dress for eight dollars, and handed the shopkeeper a ten-dollar bill: how much change ought she to receive back?

3. John bought a sled for nine cents, and paid eight cents down: how many cents does he still owe for it?

4. There are twelve weeks in a quarter, and eight of them are past: how many weeks before the quarter will end?

5. Eight from fifteen leaves how many? Seven from fifteen, how many?

6. Eight from thirteen leaves how many? Five from thirteen, how many?

7. Margaret's vacation is fourteen days long, and she has been at home eight days: how many days before she must return to school? Eight from fourteen leaves how many?

8. A boy having sixteen oranges in his basket, sold eight of them to the Railroad passengers: how many has he left?

9. A little girl went a shopping with seventeen cents in her purse, and on her return, found she had eight cents left; how much did she spend? Eight from seventeen leaves how many?

10. A man selling a cow for eighteen dollars, took eight dollars in goods and the rest in money: how much money did he receive? Eight from eighteen leaves how many?

LESSON IX.

1. If you buy a pound of sugar for nine and give the shopkeeper a ten-cent piece, how change ought he to give you?

2. In the Algebra class there are twelve ars, and nine of them recited their lesson perf how many failed? Three from twelve leave many?

3. Susan has eleven pinks and nine tulips: many tulips must she receive to make them in number to her pinks? Two from eleven l how many?

4. Harriet's age is thirteen years, and Luc nine years: how much older is Harriet than L Four from thirteen leaves how many?

5. Nine from fifteen leaves how many? from fifteen, how many?

6. Nine from fourteen leaves how many? from fourteen, how many?

7. Albert has sixteen plums, and James how many must James receive to make his nu equal to that of Albert?

8. A merchant bought a quantity of beef at enteen dollars a barrel, and finding it damaged it for nine dollars a barrel: how much did he on a barrel?

9. William had eighteen cents in his pocket on his way to school he spent nine of them: many cents had he left?

10. In school street there are nineteen shade *nine of* which are elms, and the rest are ma *how many* maple trees are there?

LESSON X.*

1. One from ten leaves how many? One from twenty? One from thirty? One from forty? One from seventy? One from sixty? One from eighty? One from fifty? One from ninety? One from a hundred?

2. Two from ten leaves how many? Two from twenty? Two from thirty? Two from forty? Two from sixty? Two from eighty? Two from fifty? Two from seventy? Two from ninety? Two from a hundred?

3. Four from ten leaves how many? Four from twenty? Four from thirty? Four from sixty? Four from forty? Four from fifty? Four from ninety? Four from seventy? Four from eighty? Four from a hundred?

4. Three from a hundred leaves how many? Three from ninety? Three from eighty? Three from seventy? Three from sixty? Three from fifty? Three from forty? Three from thirty? Three from twenty? Three from ten?

5. Five from a hundred leaves how many? Five from ninety? From eighty? Seventy? Sixty? Fifty? Forty? Thirty? Twenty?

6. Six from fourteen leaves how many? Six from Twenty? From thirty? Fifty? Forty? Sixty? Eighty? Ninety? Seventy? A hundred?

7. Seven from ten leaves how many? Seven from Twenty? From forty? Thirty? Seventy? Sixty? Eighty? Fifty? Ninety? A hundred?

* The pupil should be able to answer the questions in this and the following Lesson, with readiness, before he proceeds to the next.

8. Eight from ten leaves how many? Eight from twenty? From thirty? Fifty? Forty? Sixty? Eighty? Seventy? Ninety? A hundred?

9. Nine from ten leaves how many? Nine from twenty? From forty? Eighty? Ninety? Seventy? Fifty? Sixty? Thirty? A hundred?

LESSON XI.

1. Ten from twelve leaves how many? Ten from twenty-three? Ten from thirty-four? Ten from forty-five? Ten from fifty-six? Ten from sixty-seven? Ten from seventy-eight? Ten from eighty-nine? Ten from a hundred?

2. Five from twelve leaves how many? Five from twenty-two? Five from thirty-two? Five from sixty-two? Five from forty-two? Five from seventy-two? Five from fifty-two? Five from eighty-two? Five from ninety-two?

3. Three from eight leaves how many? Three from eighteen? Three from twenty-eight? Three from fifty-eight? Three from forty-eight? Three from sixty-eight? Three from thirty-eight? Three from seventy-eight? Three from ninety-eight? Three from eighty-eight?

4. Four from nine leaves how many? Four from nineteen? Four from thirty-nine? Four from twenty-nine? Four from sixty-nine? Four from seventy-nine? Four from fifty-nine? Four from forty-nine? Four from eighty-nine? Four from ninety-nine?

5. Six from seventeen leaves how many? Six from twenty-eight? Six from fifty-four? Six from *thirty-eight*? Six from eighty-seven?

6. Seven from twenty-five leaves how many?

Seven from forty-nine? Seven from thirty-six? Seven from sixty-three? Seven from eighty-four? Seven from ninety-eight?

LESSON XII.

1. A man bought a cow for ten dollars, and sold it again for twelve dollars: how much did he make by his bargain? Ten from twelve leaves how many? Two from twelve, how many?

2. Ten from eleven leaves how many? One from eleven, how many?

3. William's Arithmetic lesson contained thirteen questions, and he recited ten of them perfectly: how many did he miss?

4. Charles paid fifteen cents for a knife, and sold it for ten cents; how much did he lose by his bargain?

5. A robber was sentenced to the State's prison for fourteen years, and after ten years had elapsed he was pardoned out: how many years of his sentence still remained?

6. A lady went a shopping with sixteen dollars in her purse, and having paid ten dollars for a dress, gave the rest for a bonnet: what was the price of the bonnet?

7. Henry having eighteen canary birds, wishes to keep ten of them and sell the remainder: how many can he sell?

8. Ten from seventeen leaves how many? Seven from seventeen, how many?

9. In an orchard containing nineteen trees, ten of them are apple-trees, and the rest are peach-trees: *how many* peach-trees are there?

10. If a horse can go ten miles an hour and a Railroad car twenty miles an hour, how many more miles can the car go, than the horse?

LESSON XIII.

1. *Q.* In what does the solution of the preceding examples of this section, consist?

Ans. It consists in taking a *less* number from a *greater* one.

2. *Q.* What is the process of taking a less number from a greater, called?

Ans. It is called SUBTRACTION.

3. *Q.* When we subtract one number from another, what is the *answer*, or number which we obtain, called?

Ans. The DIFFERENCE or REMAINDER.

4. *Q.* When we say *eight* from *twelve* leaves *four*, which is the *greater* number? Which is the *less?* Which is the *difference* or *remainder?*

5. What is the difference between nine and fifteen?

Solution.—Nine from fifteen leaves six. *Ans.* Six.

6. What is the difference between five and nine?

7. What is the difference between six and thirteen?

8. From twenty subtract seven.

9. From thirty-five subtract six.

10. From fifty-three take ten.

11. From forty-seven take four.

12. From sixty-eight take nine.

13. From eighty-one take five.

14. From one hundred and ten take three.

15. From one hundred and sixty take eight.

EXAMPLES FOR PRACTICE.

1. James gave twelve cents for a quart of cherries, and eight cents for a quart of chestnuts: how much more did he pay for his cherries than for his chestnuts?

2. A man gave seventeen dollars for a cow, and nine dollars for a load of hay: how much more did he give for the cow than for the hay?

3. Horace having thirty-six marbles, gave ten to his cousin: how many had he left?

4. Susan had twenty-four peaches; she gave six to Harriet, and four to Ann: how many peaches had she left?

5. On a training day a little boy had fifty cents; he spent ten cents for pea-nuts and lost five cents: how many cents had he left?

6. A man bought a wagon for thirty-six dollars, and sold it for ten dollars less than cost: how much did he get for it?

7. A merchant bought a hogshead of molasses containing sixty-three gallons, and found that eight gallons had leaked out: how many gallons were left?

8. A barrel of brandy costs twenty-nine dollars, and a barrel of flour costs six dollars: what is the difference in their price?

9. The cost of a cloak is forty-five dollars, and the cost of a hat eight dollars: what is the difference in their cost?

10. A man bought a horse for seventy-five dollars, and sold it for ten dollars less than he paid: how much did he get for his horse?

11. Samuel is nineteen years old, and his sister is six years younger: how old is she?

12. The cost of an Arithmetic is twenty-five cents, and the cost of a slate is twenty cents: what is the difference in their cost?

13. Henry having thirty-six marbles, lost six and gave away five: how many had he left?

14. George having twenty-eight apples, gave three to one companion, two to another, and four to another: how many had he left?

15. A man bought a sleigh for twenty dollars and paid ten dollars for painting it; he then sold it for thirty-two dollars: did he make or lose by the bargain? How much?

16. A man owning forty acres of land, sold twenty acres of it: how many acres had he left?

17. Henry's kite line is fifty yards long, and William's is forty yards long: what is the difference in their length?

18. A farmer having a hundred bushels of wheat, sold fifty bushels: how many bushels had he left?

19. If I have seventy-five cents, and give ten to Charles, six to James, four to Susan, and six to Harriet, how many cents shall I have left?

20. If you have fifty peaches, and give ten to one companion, ten to a second, ten to a third, and ten to a fourth, how many peaches will you have left?

SECTION IV.

MULTIPLICATION.

LESSON I.

1. What will two apples cost, at one cent apiece?

Solution.—If *one* apple costs *one* cent, *two* apples will cost *two times one* cent: and two times one cent are two cents. *Ans.* Two cents.

2. What will two pears cost, at two cents apiece?

Note.—The learner should be required to give the reasoning in the solution of every example.

3. At three cents a yard, what will two yards of ribbon cost?

4. At four cents apiece, what will two oranges come to?

5. George bought two melons, at five cents apiece: how much did he pay for them?

6. If one lemon is worth six cents, how many cents are two lemons worth?

7. What will two muffs cost, at seven dollars apiece?

8. What cost two quarts of cherries, at eight cents a quart?

9. At nine cents a pound, what will two pounds of sugar cost?

Note.—The principle of *multiplying* cannot be too carefully explained to young pupils. To show them, for example, that *two* times *ten* are *twenty*, move out ten balls on one of the wires of the Numerical Frame, then move out ten on another wire and let him him count these two *tens* together.

While learning the Multiplication Table, the class may study to advantage the Lessons corresponding with its different parts, *as in Addition* and Subtraction.

MULTIPLICATION TABLE.

Two	times	one	are	two.	Two	times	six	are	twelve.
Two	"	two	"	four.	Two	"	seven	"	fourteen.
Two	"	three	"	six.	Two	"	eight	"	sixteen.
Two	"	four	"	eight.	Two	"	nine	"	eighteen.
Two	"	five	"	ten.	Two	"	ten	"	twenty.
Three	times	one	are	three.	Three	times	six	are	eighteen.
Three	"	two	"	six.	Three	"	seven	"	twenty-one.
Three	"	three	"	nine.	Three	"	eight	"	twenty-four.
Three	"	four	"	twelve.	Three	"	nine	"	twenty-sev.
Three	"	five	"	fifteen.	Three	"	ten	"	thirty.
Four	times	one	are	four.	Four	times	six	are	twenty-four.
Four	"	two	"	eight.	Four	"	seven	"	twenty-eight.
Four	"	three	"	twelve.	Four	"	eight	"	thirty-two.
Four	"	four	"	sixteen.	Four	"	nine	"	thirty-six.
Four	"	five	"	twenty.	Four	"	ten	"	forty.
Five	times	one	are	five.	Five	times	six	are	thirty.
Five	"	two	"	ten.	Five	"	seven	"	thirty-five.
Five	"	three	"	fifteen.	Five	"	eight	"	forty.
Five	"	four	"	twenty.	Five	"	nine	"	forty-five.
Five	"	five	"	twenty-five.	Five	"	ten	"	fifty.
Six	times	one	are	six.	Six	times	six	are	thirty-six.
Six	"	two	"	twelve.	Six	"	seven	"	forty-two.
Six	"	three	"	eighteen.	Six	"	eight	"	forty-eight.
Six	"	four	"	twenty-four.	Six	"	nine	"	fifty-four.
Six	"	five	"	thirty.	Six	"	ten	"	sixty.
Seven	times	one	are	seven.	Seven	times	six	are	forty-two.
Seven	"	two	"	fourteen.	Seven	"	seven	"	forty-nine.
Seven	"	three	"	twenty-one.	Seven	"	eight	"	fifty-six.
Seven	"	four	"	twenty-eight.	Seven	"	nine	"	sixty-three.
Seven	"	five	"	thirty-five.	Seven	"	ten	"	seventy.

Eight	times	one	are	eight.	Eight	times	six	are	forty-eight.
Eight	"	two	"	sixteen.	Eight	"	seven	"	fifty-six.
Eight	"	three	"	twenty-four.	Eight	"	eight	"	sixty-four.
Eight	"	four	"	thirty-two.	Eight	"	nine	"	seventy-two.
Eight	"	five	"	forty.	Eight	"	ten	"	eighty.
Nine	times	one	are	nine.	Nine	times	six	are	fifty-four.
Nine	"	two	"	eighteen.	Nine	"	seven	"	sixty-three.
Nine	"	three	"	twenty-sev.	Nine	"	eight	"	seventy-two.
Nine	"	four	"	thirty-six.	Nine	"	nine	"	eighty-one.
Nine	"	five	"	forty-five.	Nine	"	ten	"	ninety.
Ten	times	one	are	ten.	Ten	times	six	are	sixty.
Ten	"	two	"	twenty.	Ten	"	seven	"	seventy.
Ten	"	three	"	thirty.	Ten	"	eight	"	eighty.
Ten	"	four	"	forty.	Ten	"	nine	"	ninety.
Ten	"	five	"	fifty.	Ten	"	ten	"	one hundred.

Note.—It is an interesting and profitable exercise, for young pupils, to recite tables in concert. But it will not do to depend upon this method alone. It is indispensable for *every scholar* who desires to be *accurate* either in *arithmetic* or *business*, to have the common arithmetical tables *distinctly* and *indelibly* fixed in his mind. Hence, after a table has been repeated by the class in concert, or individually, the Teacher should ask many promiscuous questions, to prevent its being recited *mechanically*, from a knowledge of the *regular increase* of numbers.

LESSON II.

1. What will three quarts of strawberries cost, at one shilling a quart?

2. At two cents apiece, what will three lead pencils come to?

3. In one yard there are three feet: how many feet are there in three yards?

4. At four cents apiece, what will three oranges cost?

5. What cost three quarts of milk, at five cents a quart?

6. What cost three ounces of snuff, at six cents an ounce?

7. At seven cents a pound, what will three pounds of cheese come to?

8. In one peck there are eight quarts: how many quarts are there in three pecks?

9. If it requires nine yards of calico to make one dress, how many yards will it require to make three dresses?

10. A man gave three boys ten apples apiece: how many did he give them all?

LESSON III.

1. At one dollar a bushel, how much will four bushels of wheat cost?

2. What cost four lemons, at two cents apiece?

3. If Frederic obtains four credit marks a day, how many will he have in four days?

4. What cost four quarts of cider, at three cents a quart?

5. Jane bought four skeins of sewing silk, at five cents a skein: how much did she pay for them all?

6. In one week there are seven days: how many days are there in four weeks?

7. Henry had four class-mates, and gave them six apples apiece: how many did he give to all?

8. What cost four hats, at nine dollars apiece?

9. What cost four barrels of flour, at eight dollars a barrel?

10. At ten dollars a ton, what will four tons of hay cost?

LESSON IV.

1. At one dollar a yard, what will five yards of silk cost?
2. What cost five lemons, at three cents apiece?
3. My board costs me two dollars a week: what will it amount to in five weeks?
4. A man hired a horse for six cents a mile: how much must he pay for going five miles?
5. Sarah's cloak contains five yards of merino, which cost five shillings a yard: how much did her cloak cost?
6. What cost five pair of boots, at four dollars a pair?
7. Eight quarts make one peck: how many quarts are there in five pecks?
8. If a stage goes seven miles an hour, how far will it go in five hours?
9. At nine cents a pound, what will five pounds of butter cost?
10. What cost five yards of cloth, at ten shillings a yard?

LESSON V.

1. What cost six yards of calico, at one shilling a yard?
2. What cost six oranges, at three cents apiece?
3. There are four weeks in a month: how many weeks are there in six months?
4. What cost six yards of cloth, at two dollars a yard?
5. What cost six spools of cotton, at five cents a spool?

6. At seven cents a pound, what will a quarter of lamb weighing six pounds, come to?

7. What cost six quarts of plums, at ten cents a quart?

8. Sarah bought six yards of ribbon, at seven cents a yard: how much did she pay for it?

9. If one inkstand costs six cents, how much will six cost?

10. What cost six pounds of raisins, at eight cents a pound?

LESSON VI.

1. Helen's dress contains seven yards of calico, which cost one shilling a yard: what was the cost of her dress?

2. At three cents a skein, what will seven skeins of sewing silk cost?

3. At two cents a stick, what will seven sticks of twist cost?

4. The fare by Railroad from Boston to Albany is six dollars for one person: what will it be for a family of seven persons?

5. Four farthings make one penny: how many farthings are there in seven pence?

6. If a stage runs five miles in one hour, how far will it run in seven hours?

7. Harriet had seven rose bushes, and one morning she found eight roses upon each: how many were there upon all?

8. What cost seven pounds of lard, at seven cents a pound?

9. What cost seven dozen chairs, at nine dollars per dozen?

10. At ten shillings a yard, what is the cost of seven yards of cloth?

LESSON VII.

1. What will eight bushels of peaches cost, at one dollar a bushel?

2. If a quart of milk costs four cents, what will be the cost of eight quarts?

3. If you recite three perfect lessons a day, how many will you recite in eight days?

4. At two shillings a gallon, what will eight gallons of molasses come to?

5. In New England, six shillings make a dollar: how many shillings are there in eight dollars?

6. At five cents a pound, what cost eight pounds of figs?

7. There are eight rows of trees in an orchard, and seven trees in a row: how many trees are there in the orchard?

8. In New York, eight shillings make a dollar: how many shillings are there in eight New York dollars?

9. A farmer sold eight tons of hay, at nine dollars per ton: how much did he receive for his hay?

10. What is the value of eight cows, at ten dollars apiece?

LESSON VIII.

1. In one quart there are two pints: how many pints are there in nine quarts?

2. What cost nine caps, at one dollar apiece?

3. Three feet make a yard: how many feet are there in nine yards?

4. A traveler met nine beggars and gave each of them four shillings: how many shillings did he give to all?

5. If a hunter kills five pigeons at every shot, and fires nine times, how many will he kill?

6. How much will nine quarts of blue-berries cost, at eight cents a quart?

7. Henry's mother gave him six cents apiece for carrying nine billets: how many cents did he receive for all?

8. Susan received seven shillings a week for doing the work of the family: how much did she earn in nine weeks?

9. If a family consumes ten pounds of butter in a week, how many pounds will last them nine weeks?

10. What cost nine cords of wood, at nine shillings a cord?

LESSON IX

1. How much will ten sheep cost, at two dollars a head?

2. How much will ten barrels of flour cost, at five dollars a barrel?

3. At four dollars a yard, what will ten yards of cloth cost?

4. What cost ten bushels of corn, at three shillings a bushel?

5. What cost ten coats, at eight dollars apiece?

6. A farmer gave three bushels of wheat for a yard of cloth: how many bushels must he give for ten yards?

7. A dairy-woman bought ten yards of silk and paid for it in butter, giving seven pounds for a yard: how many pounds of butter did her silk cost?

8. At six dollars a yard, how much will ten yards *of cloth cost?*

9. Ten dollars make an eagle: how many dollars are there in ten eagles?

10. My neighbor's peach-orchard contains ten rows of trees, and there are nine trees in a row: how many peach-trees has he?

LESSON X.*

1. How many times two make eight? How many times two make twelve? Ten? Fourteen? Eighteen? Sixteen? Twenty?

2. How many times three make twelve? Nine? Fifteen? Twenty-one? Eighteen? Twenty-four? Thirty? Twenty-seven?

3. How many times four make twenty? Sixteen? Twelve? Eight? Twenty-four? Thirty-two? Thirty-six? Forty?

4. How many times five make twenty? Thirty? Twenty-five? Thirty-five? Forty? Forty-five? Fifty?

5. How many times six make eighteen? Thirty? Twenty-four? Forty-two? Thirty-six? Sixty? Forty-eight? Fifty-four?

6. How many times seven make twenty-eight? Thirty-five? Twenty-one? Forty-two? Seventy? Sixty-three? Fifty-six?

7. How many times eight make twenty-four? Thirty-two? Forty-eight? Seventy-two? Forty? Fifty-six? Eighty? Sixty-four?

8. How many times nine make twenty-seven? Forty-five? Thirty-six? Fifty-four? Seventy-two? Sixty-three? Eighty-one? Ninety?

* This and the following lesson should be studied, till the class can answer the questions with great promptitude. This they will soon be able to do, if they have *thoroughly* learned the Multiplication Table.

9. How many times ten make thirty? Twenty? Forty? Sixty? Fifty? Ninety? Eighty? Seventy? One hundred?

LESSON XI.

1. Eight* is how many times two? How many times four? How many times one?

2. Twelve is how many times two? How many times three? How many times four? How many times six? How many times one?

3. Eighteen is how many times two? How many times six? How many times three? How many times nine?

4. Sixteen is how many times eight? How many times four? How many times two?

5. Twenty is how many times two? How many times five? How many times ten? How many times four?

6. Thirty is how many times five? How many times ten? How many times six? How many times three?

7. Twenty-four is how many times four? How many times three? How many times six? How many times eight? How many times twelve? How many times two?

8. Thirty-two is how many times eight? How many times four?

9. Thirty-six is how many times six? How many times four? How many times three? How many times twelve? How many times nine?

10. Twenty-seven is how many times three? How many times nine?

* *The number eight, &c., is considered a collective noun, conveying the idea of unity, and therefore requires a verb in the singular number.*

11. Forty-two is how many times six? How many times seven?

12. Fifty-six is how many times seven? How many times eight?

13. Thirty-five is how many times seven? How many times five?

14. Seventy-two is how many times nine? How many times eight?

LESSON XII.

1. What cost five oranges, at three cents apiece?

2. What cost six thimbles, at four cents apiece?

3. A teacher bought ten inkstands, at six cents apiece: what did they come to?

4. If four boys sit on one bench, how many can sit on five benches? On seven benches?

5. Jane bought five yards of silk braid, at four cents a yard: how much did it come to?

6. Horace bought four young rabbits for eight shillings, and sold them for three shillings apiece: did he gain or lose by his bargain? How much?

7. What will ten pounds of figs cost, at eight cents a pound? At nine cents?

8. When beef is six dollars a hundred, what will a fatted ox come to which weighs nine hundred pounds?

9. If one stage can carry nine passengers, how many can four stages carry?

10. What cost nine pounds of tea, at six shillings a pound?

11. If five yards of cloth will make one cloak, how many yards will six cloaks require?

12. If a horse travels six miles an hour, how far will he travel in ten hours?

LESSON XIII.

1. *Q.* In what does the solution of the foregoing examples of this section, consist?

Ans. It consists in the *repeated addition of a given number to itself.*

2. *Q.* What is this repeated addition of a number to itself, called?

Ans. It is called MULTIPLICATION.

3. *Q.* What is the number to be *repeated*, or *multiplied*, called?

Ans. The *Multiplicand.*

4. *Q.* What is the number by which we multiply, called?

Ans. The *Multiplier.*

5. *Q.* What is the answer, or number produced called?

Ans. The *Product.*

6. *Q.* What is meant by the word *product?*

Ans. Something that is *produced* or *formed.*

7. When we say three times six are eighteen; which is the number to be multiplied? Which is the number to multiply by? Which the product?

8. When we say, four times five are twenty; which is the answer? What is the *four* called? What is the *five* called? What is the *twenty* called?

9. What is the product of seven multiplied by six?

10. What is the product of nine multiplied by five?

11. What is the product of eight multiplied by six?

12. What is the product of seven times nine? Of eight times eight? Of seven times six?

13. What is the product of eight times seven? Of nine times eight? Of nine times seven? Of six times nine? Of seven times five? Of nine times five? Of seven times ten?

14. Which is the most, three times four, or four times three?

Note.—To illustrate this point, move out four balls on the lower wire, and four apiece on the second and third wires. This will denote three times four, or four added to itself three times, which the pupil will perceive make twelve.

Again, letting these remain in their present place, move out three balls on the upper wire, also three apiece on the next three wires. This will denote four times three, or three added to itself four times, which the pupil will see make twelve, and is therefore the same as three times four.

15. Which is the most, five times three, or three times five?

16. Which is the most, five times six, or six times five? Six times seven, or seven times six?

EXAMPLES FOR PRACTICE.

1. What will six pair of skates cost, at five shillings a pair?

2. What will four caps cost, at eight shillings apiece?

3. How much will nine quarts of cherries come to, at seven cents a quart?

4. At ten dollars apiece, how much will three ploughs cost?

5. A farmer sold nine lambs, at eight shillings apiece: how much did they come to?

6. If a man gives six bushels of oats for one pair

of boots, how many bushels must he give for seven pair of boots?

7. If six men do a piece of work in ten days, how long will it take one man to do it?

8. At seven cents a bunch, how much will eight bunches of radishes cost? Nine bunches? Ten bunches?

9. Which is the most, eight times seven, or nine times six? Six times six, or four times nine? Eight times eight, or seven times nine?

10. A farmer bought six pair of shoes, at two dollars a pair, and paid four cords of wood worth two dollars a cord: how much did he still owe for his shoes?

11. Twenty-eight is how many times seven? How many times four? Sixty-three is how many times nine? Forty-eight is how many times six?

12. Fifty-six is how many times eight? Forty-five is how many times nine? Forty-two is how many times six? Forty-nine is how many times seven?

13. Eighty-one is how many times nine? Forty is how many times ten? Eighty is how many times ten?

14. Which is the most, four times eight, or three times nine?

15. Which is the most, five times seven, or four times ten?

16. Which is the most, six times eight, or nine times six?

17. Which is the most, seven times nine, or eight times seven?

18. If side combs cost nine cents a pair, what will five pair cost? Eight pair? Nine pair? Seven pair? Ten pair?

19. What cost nine papers of pins, at two shillings a paper? At four shillings?

20. Nine times three are how many? Nine times four? Nine times six?

21. If a barrel of maple sap will make eight pounds of sugar, how many pounds will four barrels make? Seven barrels? Eight barrels?

22. What cost seven penknives, at six shillings apiece?

23. Edwin bought six pencils and gave two apples apiece for them; also four quills and gave three apples apiece for them: how many apples did he give for his pencils and quills together?

24. If one acre of ground produces ten bushels of wheat, how many bushels will six acres produce? Ten acres?

25. Seven times six are how many? Seven times eight? Seven times nine? Eight times nine? Six times nine?

26. Charlotte bought six primers, at nine cents apiece: what did they come to?

27. A lady bought ten yards of calico, at ten cents a yard; and four spools of cotton, at five cents a spool: what did her bill amount to?

28. A man bought ten sheep, at two dollars a head; and four cows, at ten dollars a head: how much did he give for all?

29. Henry bought seven quarts of cherries, at nine cents a quart; and ten quarts of strawberries, at six cents a quart: which cost the most?

30. Which will cost the most, nine slates at eight cents apiece, or ten inkstands at seven cents apiece?

SECTION V.

DIVISION.

LESSON I.

1. How many pears, at one cent apiece, can you buy for two cents?

Solution.—Since *one* cent will buy *one* pear, two cents will buy as many pears, as *one* cent is contained times in *two* cents: and one cent is contained in two cents, *two* times. *Ans.* Two pears.

Note.—The reasoning should be given in the solution of every example.

2. At two cents a yard, how many yards of tape can you buy for four cents?

Suggestion.—To find how many times *two* cents are contained in *four* cents, the learner must think how many times *two* make *four*.

3. At two cents apiece, how many oranges can be bought for six cents?

4. George bought ten marbles, which he divided among his little brothers, giving them two apiece: how many brothers had he?

Suggestion.—Since he gave two marbles to each, he manifestly had as many brothers, as two marbles are contained times in ten marbles.

Note.—The principle of dividing may be illustrated in the following manner: Pass across ten balls on one of the wires, which may represent the ten marbles. Now since he gave two marbles to each brother, moving out two balls will denote one brother; moving out two more will denote another still; and so on, every two balls will denote one brother, till all the balls are removed or exhausted. Finally, counting the number of *twos* or pair of balls moved out, it will show how many times two marbles are contained in ten marbles, which is the number of brothers he had.

5. How many lead pencils, at two cents apiece, can you buy for eight cents?

6. Henry had twelve shillings which he laid out in books, at two shillings apiece; how many books did he buy?

7. Julius had fourteen marbles which he wished to divide into two equal piles: how many must he put in a pile?

8. How many pounds of ginger, at two shillings a pound, can be bought for sixteen shillings?

9. A man laid out eighteen shillings in apples, at two shillings a bushel: how many bushels did he buy?

10. A man bought twenty dollars worth of shoes, at two dollars a pair: how many pair did he buy?

Note.—The Division Table should be studied in the same manner as the preceding Tables.

DIVISION TABLE.

Two	in two,	once.	Two	in twelve,	six times.
Two	"four,	two times.	Two	"fourteen,	seven "
Two	"six,	three "	Two	"sixteen,	eight "
Two	"eight,	four "	Two	"eighteen,	nine "
Two	"ten,	five "	Two	"twenty,	ten "
Three	in three,	once.	Three	in eighteen,	six times.
Three	"six,	two times.	Three	"twenty-one,	seven "
Three	"nine,	three "	Three	"twenty-four,	eight "
Three	"twelve,	four "	Three	"twenty-sev.,	nine "
Three	"fifteen,	five "	Three	"thirty,	ten "
Four	in four,	once.	Four	in twenty-four,	six times.
Four	"eight,	two times.	Four	"twenty-eight,	seven "
Four	"twelve,	three "	Four	"thirty-two,	eight "
Four	"sixteen,	four "	Four	"thirty-six,	nine "
Four	"twenty,	five "	Four	"forty,	ten "

Five	in five,	once.	Five	in thirty,	six times.
Five	"ten,	two times.	Five	"thirty-five,	seven "
Five	"fifteen,	three "	Five	"forty,	eight "
Five	"twenty,	four "	Five	"forty-five,	nine "
Five	"twenty-five,	five "	Five	"fifty,	ten "
Six	in six,	once.	Six	in thirty-six,	six times.
Six	"twelve,	two times.	Six	"forty-two,	seven "
Six	"eighteen,	three "	Six	"forty-eight,	eight "
Six	"twenty-four,	four "	Six	"fifty-four,	nine "
Six	"thirty,	five "	Six	"sixty,	ten "
Seven	in seven,	once.	Seven	in forty-two,	six times.
Seven	"fourteen,	two times.	Seven	"forty-nine,	seven "
Seven	"twenty-one,	three "	Seven	"fifty-six,	eight "
Seven	"twenty-eight,	four "	Seven	"sixty-three,	nine "
Seven	"thirty-five,	five "	Seven	"seventy,	ten "
Eight	in eight,	once.	Eight	in forty-eight,	six times.
Eight	"sixteen,	two times.	Eight	"fifty-six,	seven "
Eight	"twenty-four,	three "	Eight	"sixty-four,	eight "
Eight	"thirty-two,	four "	Eight	"seventy-two,	nine "
Eight	"forty,	five "	Eight	"eighty,	ten "
Nine	in nine,	once.	Nine	in fifty-four,	six times.
Nine	"eighteen,	two times.	Nine	"sixty-three,	seven "
Nine	"twenty-ev.,	three "	Nine	"seventy-two,	eight "
Nine	"thirty-six,	four "	Nine	"eighty-one,	nine "
Nine	"forty-five	five "	Nine	"ninety,	ten "
Ten	in ten,	once.	Ten	in sixty,	six times.
Ten	"twenty,	two times.	Ten	"seventy,	seven "
Ten	"thirty,	three "	Ten	"eighty,	eight "
Ten	"forty,	four "	Ten	"ninety,	nine "
Ten	"fifty,	five "	Ten	"a hundred,	ten "

LESSON II

1. When oranges are three cents apiece, how many can you buy for six cents? How many times three make six?

2. At three cents a yard, how many yards of ribbon can you buy for nine cents? How many times three make nine?

3. George has two apples which he wishes to divide equally among three of his companions: how many will each receive? How many times three make twelve?

4. A man divided eighteen oranges equally among his three sons: how many did each receive?

5. If you walk three miles an hour, how long will it take you to walk fifteen miles? How many times three make fifteen?

6. If you had twenty-one marbles to give three of your companions, how many could you give them apiece?

7. How many barrels of cider, at three dollars a barrel, can I buy for twenty-four dollars? How many times three in twenty-four?

8. A man wishes to set out twenty-seven peach-trees in three rows: how many must he put in a row?

9. Three boys caught thirty fishes, and agreed to divide them equally: how many will each one have?

10. If one man can do a piece of work in twenty-one days, how long will it take three men to do it?

LESSON III.

1. How many lemons, at four cents apiece, can be bought for eight cents? How many times four make eight?

2. At four shillings a gallon, how many gallons of molasses can be bought for twelve shillings?

3. William desires to divide twenty apples equally among four boys: how many must he give them apiece?

4. Four scholars recited twenty-four questions in arithmetic: how many questions did each recite?

5. The price of a pair of boots is four dollars: how many pair can I buy for sixteen dollars?

6. If a man walks four miles an hour, how long will it take him to walk thirty-two miles?

7. How long will it take him to walk twenty-eight miles, at four miles an hour?

8. Four boys find a purse containing thirty-six cents, which they wish to divide equally: how many cents will each one receive?

9. A school which contained forty scholars, was divided into four equal classes: how many scholars were there in a class?

LESSON IV.

1. How many spools of cotton at five cents a spool, can be bought for ten cents? How many times five make ten?

2. How many barrels of flour, at five dollars a barrel, can you buy for twenty dollars?

3. At five shillings a pound, how many pounds of tea can I buy for fifteen shillings?

4. At five cents a pound, how many pounds of lard can be bought for thirty cents?

5. James has twenty-five cents which he wishes to lay out in lemons, which cost five cents apiece: how many can he buy?

6. When milk is five cents a quart, how many quarts can you buy for forty cents?

7. If you have fifty cents, how many tops can you buy, at five cents apiece?

8. If a man travels five miles an hour, how long will it take him to travel forty-five miles?

9. How long will it take a man to travel fifty miles, if he travels five miles an hour?

LESSON V.

1. If I had twelve cents, how many bunches of quills could I buy, at six cents a bunch?

2. If you had twenty-four peaches to give to six of your companions, how many could you give them apiece?

3. At six dollars a yard, how many yards of cloth can I buy for eighteen dollars?

4. At six cents an ounce, how many ounces of peppermints can you buy for thirty cents?

5. How many hats, at six dollars apiece, will forty-two dollars buy?

6. How many pounds of tea, at six shillings a pound, will thirty-six shillings buy?

7. A man laid out sixty shillings for lambs, at six shillings apiece: how many did he buy?

8. A merchant paid fifty-four dollars for six muffs: how much was that apiece?

9. At six shillings a bushel, how many bushels of wheat will forty-eight shillings buy?

LESSON VI.

1. Sarah bought seven yards of silk braid for twenty-eight cents: how much did she give a yard?
2. Susan laid out forty-two cents for ribbon worth seven cents a yard: how many yards did she get?
3. If seven yards of cloth make one suit of clothes, how many suits will twenty-one yards make?
4. A teacher wishes to give fourteen pencils to a class of seven scholars: how many pencils can he give to each?
5. George has thirty-five pears to give seven boys: how many can he give them apiece?
6. At seven cents a pound, how many pounds of cotton can be bought for fifty-six cents?
7. Seven days make a week: how many weeks are there in forty-nine days?
8. If a stage goes seven miles an hour, how long will it be in going seventy miles?
9. A man paid sixty-three cents for seven pounds of sugar, what was that a pound?

LESSON VII.

1. A man gave sixteen shillings to eight beggars: how much did he give to each?
2. Sarah has twenty-four roses to give to eight little girls: how many can she give them apiece?
3. How many sheep, at eight shillings a head, can I buy for forty shillings?
4. Eight quarts make a peck: how many pecks are there in thirty-two quarts?
5. At eight dollars a ton, how much coal, can I buy for sixty-four dollars?

6. When cherries are eight cents a quart, how many quarts can you buy for fifty six cents?

7. If you have forty-eight cents, how many slates can you buy, at eight cents apiece?

8. If you read eight pages a day, how long will it take you to read a book through, which has seventy-two pages?

9. If a school contains eighty scholars, how many classes can be formed containing eight scholars apiece?

LESSON VIII.

1. When butter is nine cents a pound, how many pounds will twenty-seven cents buy?

2. At nine dollars a barrel, how many barrels of beef can I buy for thirty-six dollars?

3. If nine yards of cloth will make one cloak, how many cloaks will eighteen yards make?

4. If you can buy a quart of molasses for nine cents, how many quarts can you buy for forty-five cents?

5. If nine yards of silk cost seventy-two shillings, what will one yard cost?

6. A man paid sixty-three dollars for nine tons of hay: what was that per ton?

7. A tavern-keeper gave fifty-four quarts of oats to nine horses: how many quarts did he give to each horse?

8. If you recite nine questions in arithmetic a day, how many days will it take you to recite eighty-one questions?

9. How many cows, at nine dollars apiece, can a man buy for ninety dollars?

LESSON IX.

1. How many cows, at ten dollars a head, can a man buy for twenty dollars?

2. A certain school contained forty scholars, which the teacher formed into classes of ten scholars each: how many classes did he form?

3. At ten dollars per acre, how many acres of land can be bought for fifty dollars?

4. A man paid eighty cents for a horse and chaise to ride ten miles: how much was that a mile?

5. How many sheep, at ten shillings a head, can be bought for ninety shillings?

6. A man laid out sixty dollars for hay, at ten dollars per ton: how many tons did he buy?

7. If I pay ten cents a quart for blackberries, how many quarts can I buy for thirty cents?

8. A dairy-woman has seventy pounds of butter, which she wishes to divide equally among ten customers: how many pounds can she send to each?

9. If you divide a hundred marbles into ten equal piles, how many will there be in a pile?

LESSON X.

1. In eight, how many times four? How many times two? How many times one?

2. In six, how many times two? How many times three? One? Six?

3. In twelve, how many times two? Three? Four? Six?

4. In ten, how many times five? Two? One?

5. In sixteen, how many times eight? Four? Two? One?

6. In twenty-four, how many times two? Three? Four? Six? Eight?

7. In eighteen, how many times two? Three? Six? Nine?

8. In twenty, how many times two? Ten? Five?

9. In thirty-six, how many times six? Nine? Three? Four? Two?

10. In thirty-two, how many times eight? Four?

11. In twenty-eight, how many times seven? Four? Two?

12. In forty, how many times ten? Eight? Five?

13. In forty-eight how many times eight? Six?

14. In sixty-three, how many times seven? Nine?

15. In fifty-six, how many times seven? Eight?

LESSON XI.

1. How many times is three contained in twelve? In eighteen? In fifteen? In twenty-one? In twenty-four? In thirty? In twenty-seven?

2. How many times is five contained in fifteen? In twenty-five? In thirty-five? In fifty?

3. How many times is four contained in sixteen? In twenty-four? In thirty-two? In forty? In thirty-six? In twenty-eight?

4. How many times is six contained in eighteen? In thirty? In twenty-four? In thirty-six? In forty-two? In fifty-four?

5. How many times is eight contained in twenty-four? In thirty-two? In forty-eight? In sixty-four? In fifty-six? In seventy-two?

6. How many times is seven contained in twenty-eight? In thirty-five? In forty-two? In fifty-six? In forty-nine? In sixty-three?

7. How many times is nine contained in twenty-seven? In forty-five? In thirty-six? In fifty-four? In sixty-three?

8. In thirteen, how many times four, and how many over?

Ans. Three times, and one over.

9. Why?

Ans. Because, three times four are twelve, and twelve from thirteen leaves one.

10. In seventeen, how many times five, and how many over?

11. In twenty-six, how many times six, and how many over?

12. In twenty, how many times three, and how many over?

13. In forty-three, how many times five, and how many over?

14. In thirty-nine, how many times six, and how many over?

LESSON XII.

1. How many oranges, at four cents apiece, can you buy for twenty cents?

2. How many thimbles can Sarah buy for thirty-five cents, if she pays seven cents apiece?

3. George paid twenty-four cents for six lead pencils: how much was that apiece?

4. A man gave forty-five dollars for nine sheep: what was the price of the sheep per head?

5. If a man travels seven miles an hour, how long will it take him to travel sixty-three miles?

6. A gentleman divided thirty-five cents equally among five boys: how many cents did each receive?

7. How many barrels of flour, at six dollars a barrel, can be bought for forty-eight dollars?

8. A hatter had forty hats, which he packed in five boxes: how many did he put in a box?

9. A man wishes to walk from New Haven to Hartford, a distance of thirty-six miles: how long will it take him, if he walks four miles an hour?

10. Seven boys found a pocket-book containing forty-nine dollars, which they shared equally: how much did each receive?

11. When coal is eight dollars a ton, how much can I buy for fifty-six dollars?

12. If one man can build a barn in forty days, how long would it take four men to build it?

LESSON XIII.

1. *Q.* In what does the solution of the preceding examples of this section, consist?

Ans. It consists in *finding how many times one number is contained in another.*

2. *Q.* What is the process of finding how many times one number is contained in another, called?

Ans. It is called DIVISION.

3. *Q.* What is the number to be divided, called?

Ans. The *Dividend.*

4. *Q.* What is the number by which we divide, called?

Ans. The *Divisor.*

5. *Q.* What is the answer, called?

Ans. The *Quotient.*

6. *Q.* What is the number that is sometimes left after dividing, called?

Ans. The *Remainder.*

7. When we say four is contained in twenty-seven, six times and three over, which is the number to be *divided?* Which the number we divide by? Which the quotient? Which the remainder?

8. When we say, five is contained in thirty-eight, seven times and three over, what is the five called? What is the thirty-eight called? What is the seven called? What is the three called?

9. What is the quotient of twenty-three divided by four, and what the remainder?

10. Five in twenty-eight, how many times, and what the remainder?

11. Six in thirty-four, how many times, and how many over?

12. Eight in fifty, how many times, and how many over?

EXAMPLES FOR PRACTICE.

1. George paid twenty-four cents for six lemons: how much did they cost apiece?

2. If a man walks five miles an hour, how long will it take him to go forty miles?

3. How many yards of ribbon, at seven cents a yard, can you purchase for twenty-one cents? For thirty-five cents? For forty-two cents?

4. How many thimbles, at six cents apiece, can Mary buy for twenty-four cents? For thirty cents? For forty-two cents? For fifty-four cents?

5. At eight cents a quart, how many quarts of blackberries can you buy for sixteen cents? For thirty-two cents? For forty-eight cents? For twenty-four cents?

6. A man paid forty dollars for eight yards of cloth: how much was that per yard?

7. Henry had sixty-four marbles, which he gave to eight companions: how much did each receive?

8. In three times four, how many times two?

Solution.—Three times four are twelve: and two is contained in twelve, six times. *Ans.* Six times.

9. In two times eight, how many times four?

10. In three times six, how many times nine?

11. In eight times three, how many times six?

12. In four times ten, how many times eight?

13. In five times four, how many times ten?

14. In six times six, how many times nine?

15. Three times six are how many times two?

16. Four times six are how many times eight?

17. Six times six are how many times four?

18. How many weeks are there in forty-two days, there being seven days in a week? In thirty-five days, how many weeks?

19. A man laid out twenty-eight shillings in wheat, at seven shillings a bushel: how many bushels did he buy?

20. If slates cost eight cents apiece, how many can you buy for sixty-four cents?

21. If the price of coffee is nine cents a pound, how many pounds can I buy for forty-five cents? For sixty-three cents? For seventy-two cents?

22. If land is ten dollars an acre, how many acres can a man buy for eighty dollars?

23. At seven dollars a yard, how many yards of cloth can be bought for sixty-three dollars?

24. How long will it take a stage to go seventy-two miles, if it goes at the rate of eight miles an hour?

SECTION VI.

ARABIC NOTATION.

In the preceding lessons, *numbers* have been expressed by *words*. In business calculations, however, they are commonly denoted by the following *figures*; viz:

1	2	3	4	5	6	7	8	9	0
one,	two,	three,	four,	five,	six,	seven,	eight,	nine,	naught.*

To express *ten*, we use 1 and 0, thus 10; to express *eleven*, we use two 1s, thus 11; to express *twelve*, we use 1 and 2, thus 12; and so on, as in the following

TABLE.

1, one.	21, twenty-one.	41, forty-one.
2, two.	22, twenty-two.	42, forty-two.
3, three.	23, twenty-three.	43, forty-three.
4, four.	24, twenty-four.	44, forty-four.
5, five.	25, twenty-five.	45, forty-five.
6, six.	26, twenty-six.	46, forty-six, &c.
7, seven.	27, twenty-seven.	50, fifty.
8, eight.	28, twenty-eight.	51, fifty-one, &c.
9, nine.	29, twenty-nine.	60, sixty.
10, ten.	30, thirty.	61, sixty-one, &c.
11, eleven.	31, thirty-one.	70, seventy.
12, twelve.	32, thirty-two.	71, seventy-one, &c.
13, thirteen.	33, thirty-three.	80, eighty.
14, fourteen.	34, thirty-four.	81, eighty-one, &c.
15, fifteen.	35, thirty-five.	90, ninety.
16, sixteen.	36, thirty-six.	91, ninety-one, &c.
17, seventeen.	37, thirty-seven.	100, one hundred.
18, eighteen.	38, thirty-eight.	200, two hundred.
19, nineteen.	39, thirty-nine.	300, three hundred, &c.
20, twenty.	40, forty.	1000, one thousand.

* *The pupil* should be able to *distinguish* and to *write* these ten figures, *before he attempts* to express larger numbers. By a few hints from *his teacher as to* the manner of combining them, he will easily learn to express any number.

ROMAN NOTATION.

Another method of expressing numbers is by the llowing letters; viz: I, V, X, L, C, D, M. The anner of doing this may be learned from the fol-wing

TABLE.

lenotes	one.	XXX denote	thirty.
	" two.	XL "	forty.
I	" three.	L "	fifty.
	" four.	LX "	sixty.
	" five.	LXX "	seventy.
	" six.	LXXX "	eighty.
II	" seven.	XC "	ninety.
III	" eight.	C "	one hundred.
	" nine.	CI "	one hundred and one.
	" ten.	CX "	one hundred and ten.
I	" eleven.	CC "	two hundred.
II	" twelve.	CCC "	three hundred.
III	" thirteen.	CCCC "	four hundred.
IV	" fourteen.	D "	five hundred.
V	" fifteen.	DC "	six hundred.
VI	" sixteen.	DCC "	seven hundred.
VII	" seventeen.	DCCC "	eight hundred.
VIII	" eighteen.	DCCCC "	nine hundred.
IX	" nineteen.	M "	one thousand.
X	" twenty.	MC "	one thousand & one hund.
XI	" twenty-one.	MD "	one thousand & five hund.
XII	" twenty-two.	MDCCCXLVI, one thousand eight hundred and forty-six.	

EXERCISES IN NOTATION.

I. Write the following numbers in *figures* upon ur slate, or black-board:

1. Eleven.
2. Seventeen.
3. Twenty-one.
4. Sixty-three.
5. Forty-seven.
6. Eighty-six.
7. Seventy-eight.
8. Fifty-seven.
9. Sixty-five.
10. Ninety-three.
11. Eighty-nine.
12. Ninety-five.

13. One hundred and one.
14. One hundred and five.
15. One hundred and seven.
16. One hundred and ten.
17. Two hundred and fourteen.
18. Four hundred and twenty-three.
19. Three hundred and ninety-five.
20. Three hundred.
21. Two hundred and thirty.
22. Six hundred.
23. Four hundred and fifty-five.
24. Seven hundred and sixty.
25. Eight hundred and sixty-five.
26. Nine hundred and eighty-seven.
27. One thousand.

1. *Q.* What is the art of expressing numbers, figures and letters, called?

Ans. It is called NOTATION.

2. *Q.* What is the method of expressing numb by *figures*, called?

Ans. The *Arabic* Notation.

3. *Q.* Why is it called the Arabic notation,

Ans. Because it was invented by the *Arabians*

4. *Q.* What is the method of expressing numb by *letters*, called?

Ans. The *Roman* Notation.

5. *Q.* Why is it called the Roman Notation?

Ans. Because it was invented by the *Romans*.

6. *Q.* Which of the above systems of Notation commonly used?

Ans. The *Arabic* Notation.

7. *Q.* What is the art of reading numbers pressed by figures, called?

Ans. It is called NUMERATION.

EXERCISES IN NUMERATION.

Read the numbers expressed by the following figures:

13	57	100	310
17	39	101	295
25	76	119	430
52	48	116	375
36	79	107	537
71	91	121	426
63	37	110	111
27	81	130	239
19	65	126	685
43	58	140	491
34	83	129	507
56	89	105	810
41	92	150	740
65	78	162	936
24	94	201	845
68	86	214	987
73	98	196	1000

Read the numbers expressed by the following figures:

1845	1850	1855	1860
2167	4101	6705	6200
578	5060	7039	7000
2861	2805	4000	5203
3420	6729	7210	8000
1605	2508	6400	8400
408	3091	1601	7609
4376	2930	3700	3491
2024	6238	4890	9000
5230	7304	5000	8468
1040	7490	8245	9999

MISCELLANEOUS EXAMPLES.

Note.—The Teacher will divide the Miscellaneous Examples into lessons to suit the capacity of the learner.

1. James bought a lemon for 4 cents, and a pound of figs for 8 cents: how much did he pay for both?

Solution.—4 cents and 8 cents are 12 cents. *Ans.* 12 cents.

2. A man bought a pound of tea for 4 shillings, and a gallon of molasses for 3 shillings: how many shillings did he pay for both?

3. Horace paid 6 cents for some marbles, and 3 cents for a top, and 1 cent for a whistle: how many cents did he pay for all?

4. How many are 5 and 13? 22 and 4? 3 and 16? 4 and 13?

5. How many are 6 and 12? 5 and 14? 4 and 17? 16 and 5?

6. How much will 3 oranges cost, at 4 cents apiece?

Solution.—If 1 orange costs 4 cents, 3 oranges will cost 3 times as much: and 3 times 4 cents are 12 cents. *Ans.* 12 cents.

7. If 1 quart of strawberries cost 6 cents, what will 2 quarts cost? 2 times 4 are how many?

8. What cost 3 barrels of flour, at 5 dollars a barrel? 4 barrels? 5 barrels?

9. What cost 10 lambs, at 7 shillings apiece?

10. What cost 4 bushels of cranberries, at 3 dollars a bushel? 6 bushels?

11. What cost 6 sheep, at 4 dollars a head? 8 sheep?

12. What cost 8 cords of wood, at 3 dollars a cord? 7 cords? 10 cords?

13. How many are 7 times 3? 5 times 8? 6 times 4? 4 times 8?

14. Henry had 9 apples, and gave away 4: how many had he left?

Solution.—4 apples taken from 9 apples leave 5 apples. *Ans.* 5 apples.

15. Sarah had 10 peaches, and gave away 3: how many had she left?

16. If you have 12 marbles, and lose 5 of them, how many will you have left?

17. 3 from 17 leaves how many? 5 from 18? 4 from 19?

18. 5 from 11 leaves how many? 6 from 10? 7 from 12? 8 from 13? 6 from 15?

19. William bought a knife for 18 cents, and sold it for 5 cents less than cost: how much did he sell it for?

20. How many yards of ribbon, at 6 cents a yard, can be bought for 30 cents?

Solution.—If 6 cents buy 1 yard, 30 cents will buy as many yards as 6 is contained times in 30: and 6 is contained in 30, 5 times. *Ans.* 5 yards.

21. How many bushels of corn, at 4 shillings a bushel, can a man buy for 16 shillings?

22. If I have 18 peaches to give to 6 boys, how many can I give them apiece?

23. How many hats, at 5 dollars apiece, can you buy for 20 dollars?

24. How many times 6 in 24? In 30? In 42?

25. How many times 4 in 28? In 20? In 36? In 40? In 24?

26. A man bought 8 yards of cloth, at 3 dollars a yard, and paid for it in flour, at 4 dollars a barrel: how many barrels did it take?

Solution.—First find how much the cloth comes to. If 1 yard is worth 3 dollars, 8 yards are worth 8 times as much; and 8 times 3 dollars are 24 dollars. Now it will manifestly take as many barrels of flour to pay for the cloth, as 4 dollars are contained times in 24 dollars; and 4 in 24, 6 times. *Ans.* 6 barrels.

27. A farmer bought 6 pounds of tea, at 4 shillings a pound, and paid for it in wheat, at 8 shillings a bushel: how many bushels did it take?

28. A man bought a cow for 10 dollars, and sold it for 16 dollars: how much did he make by his bargain?

29. If Horatio buys 6 oranges, at 3 cents apiece, and sells them again for 4 cents apiece, how much will he make by his bargain?

30. In 5 times 8, how many times 10?

31. In 6 times 6, how many times 4?

32. In 8 times 3, how many times 6?

33. A butcher sold 8 pounds of beef for 56 cents: what was that a pound?

34. A dairy-man sold 10 pounds of butter for 80 cents: how much did he get a pound?

35. A farmer sold 10 bushels of oats, at 3 shillings a bushel, and took 7 yards of flannel, at 4 shillings a yard, and the rest in money: how much money did he receive?

36. What is the difference between 3 times 6, and 7 times 3?

37. What is the difference between 5 times 6, and 4 times 8?

38. In 21, how many times 5, and how many over? *Ans.* 4 times and 1 over.

39. In 18 how many times 4, and how many over?

40. In 30, how many times 7, and how many over?

41. In 37, how many times 9, and how many over?

42. In 45, how many times 7, and how many over?

43. In 66, how many times 9, and how many over?

44. If 3 coats cost 24 dollars, how much will 1 coat cost?

Solution.—If 3 coats cost 24 dollars, 1 coat will cost as many dollars as 3 is contained times in 24: and 3 is contained in 24, 8 times. *Ans.* 8 dollars.

45. How many hats, at five dollars a piece, can be bought for 35 dollars?

46. How much flour, at 7 dollars a barrel, can a man buy for 42 dollars?

47. How many yards of cloth, at 9 dollars a yard, will 36 dollars buy?

48. How many tons of coal, at 8 dollars a ton, will 64 dollars buy?

49. A man bought 8 pair of boots at 3 dollars a pair, and paid for them in flour, at 6 dollars a barrel: how many barrels did it take?

50. If you buy 4 penknives at 10 cents apiece, and pay for them in beechnuts, at 5 cents a quart, how many quarts will it take?

51. A farmer sold 6 pounds of butter for 10 cents a pound, and took his pay in molasses, at 6 cents a quart: how many quarts did he receive?

52. When wheat is 7 shillings a bushel, how many bushels can be bought for 63 shillings?

53. Six boys found a purse of money containing 48 dollars, which they divided among themselves equally: how many dollars did each receive?

54. If a man has 45 dollars, how many whole barrels of flour can he buy, at 6 dollars a barrel, and how many dollars will he have over?

55. At 5 dollars a yard, how many whole yards of cloth can be bought for 28 dollars, and how many dollars over?

56. In 85, how many times 9, and how many over?

57. In 107, how many times 10, and how many over?

58. In 95, how many times 9, and how many over?

59. In 83, how many times 8, and how many over?

60. In 109, how many times 10. and how many over?

61. Henry bought a Geography for 50 cents, and a Reader for 20 cents: how much did he give for both?

Solution.—50 is equal to 5 tens, and 20 is equal to 2 tens: now 5 tens and 2 tens are 7 tens; and 7 tens are equal to 70. *Ans.* 70 cents.

62. How many tens in 30? In 70?

63. How many tens in 40? In 90?

64. How many tens in 80? In 100?

65. 4 tens are equal to how many?

66. 6 tens are equal to how many?

67. 7 tens are equal to how many?

68. 9 tens are equal to how many?

69. 8 tens are equal to how many?

70. 10 tens are equal to how many?

71. 3 tens and 5 tens are how many?

Solution.—3 tens and 5 tens are 8 tens: and 8 tens are equal to 80.

72. 6 tens and 4 tens are how many?

73. How many are 30 and 50?

74. How many are 60 and 30?

75. How many are 40 and 40?

76. Henry bought 30 marbles, and his uncle gave him 40 more: how many marbles had he then?

77. If a pound of tea costs 50 cents, and a gallon of molasses 40 cents, how much will both cost?

78. A man gave 40 dollars for a cart, and 60 dollars for a yoke of oxen: how much did he give for both?

79. A farmer sold a horse for 90 dollars, and a cow for 30 dollars: how much did he get for both?

Solution.—90 is equal to 9 tens, and 30 is equal to 3 tens: 9 tens and 3 tens are 12 tens; and 12 tens are equal to 120. *Ans.* 120 dollars.

80. James gave 60 cents for a sled, 90 cents for a pair of skates, and 8 cents for a knife: how much did he give for all?

81. If a man travels 70 miles the first day, and 40 the next day, how far will he travel in both days?

82. Harriet gave 25 cents for her Reader, and 37 cents for her Practical Arithmetic: how much did she give for both?

Solution.—25 is composed of 2 tens and 5 units, and 37 is composed of 3 tens and 7 units: now 2 tens and 3 tens are 5 tens or 50; and 5 units and 7 units are 12 units, which added to 50 make 62. *Ans.* 62 cents.

83. How many are 32 and 45?

84. How many are 56 and 28?

85. How many are 72 and 47?

86. How many are 61 and 82?

87. A man bought a horse for 75 dollars, and a buggy for 63 dollars: how much did he pay for both?

88. A farmer raised 54 bushels of corn on one

acre, and 48 bushels on another: how many bushels did he raise on both acres?

89. A man gave 90 cents for a bushel of wheat, and 40 cents for a bushel of rye: how much more did he pay for his wheat than for his rye?

Solution.—90 is 9 tens, and 40 is 4 tens: now 4 tens from 9 tens leave 5 tens; and 5 tens are equal to 50. *Ans.* 50 cents.

90. Frank gave 80 cents for a Dictionary, and 50 cents for a Geography: how much more did he pay for his Dictionary than for his Geography?

91. William, having 100 cents, spent 60 of them: how many cents had he left?

92. If Sarah reads 80 pages in a day, and Susan reads 50, how many more pages will Sarah read than Susan?

93. A man put 75 sheep into a pasture, but 20 of them jumped out: how many remained in the pasture?

94. 25 from 45 leaves how many?

95. 36 from 76 leaves how many?

96. 72 from 85 leaves how many?

97. 63 from 79 leaves how many?

98. 84 from 97 leaves how many?

99. A farmer sold 5 cows, at 30 dollars a head: how much did they come do?

Solution.—If 1 cow costs 30 dollars, 5 cows will cost 5 times as much. Now 30 is equal to 3 tens, and 5 times 3 tens are 15 tens; and 15 tens are equal to 150. *Ans.* 150 dollars.

100. A drover bought 20 sheep, at 8 shillings a head: how much did he give for all?

101. A dairy-woman sold 40 pounds of cheese *for 7 cents* a pound: how much did it come to?

102. A merchant sold 60 pounds of sugar for 8 cents a pound: how much did it come to?

103. A manufacturer sold 100 yards of cotton cloth for 9 cents a yard: how much did it come to?

104. How much will 3 melons cost at 15 cents apiece?

Solution.—If 1 melon costs 15 cents, 3 melons will cost 3 times as much. Now 15 is composed of 10 and 5: but 3 times 10 are thirty, and 3 times 5 are 15; and 15 added to 30 make 45. *Ans.* 45 cents.

105. What will 4 slates cost, at 14 cents apiece?

106. What cost 5 pounds of butter, at 16 cents a pound?

107. What will 7 yards of cloth come to, at 15 shillings a yard?

108. A farmer sowed 6 acres of oats, which yielded 25 bushels per acre: how many bushels of oats did he have?

Solution.—25 is composed of 2 tens and 5 units: now 6 times 2 tens are 12 tens, or 120, and 6 times 5 are 30; and 30 added to 120 make 150. *Ans.* 150 bushels.

109. At 35 dollars apiece, how much will 5 acres of land cost?

110. At 42 dollars apiece, how much will 7 sleighs cost?

111. Joseph bought 7 oranges, at 4 cents apiece, and sold them at 5 cents apiece: how much did he make by his bargain?

Suggestion.—The learner should first find how much he paid for the oranges, then how much he received for them; finally, taking the sum he paid

from the sum he received, the remainder will be his gain.

112. A man bought 10 sheep at 7 shillings a head, and sold them again at 9 shillings a head: how much did he gain by the bargain?

113. A merchant bought 8 barrels of flour, at 9 dollars a barrel, and sold them at 6 dollars a barrel: how much did he lose by his bargain?

114. A man bought 6 hats at 4 dollars apiece, and 5 yards of cloth at 6 dollars a yard: how much did he pay for both?

115. A farmer sold 7 pounds of veal at 3 cents a pound, and 4 pounds of butter at 8 cents a pound: how much did he receive for both?

116. If I buy 8 pounds of sugar at 7 cents a pound, and 10 lemons at 3 cents apiece, how much must I pay for both?

117. If 5 boys can saw a cord of wood in 4 hours, how long will it take 1 boy to saw a cord?

118. If 10 men can do a job of work in 20 days, how long will it take one man to do it?

119. If a barrel of flour will last 6 men 15 days, how long will it last 1 man?

120. If 6 men can dig a cellar in 4 days, how many men will it take to dig it in 1 day?

121. James divided 100 oranges equally among 10 companions: how many oranges did he give to each?

122. A man paid 63 dollars for 9 yards of cloth: how much was that a yard?

123. A farmer sold 9 lambs for 72 shillings: how much did he receive apiece?

124. A merchant sold 9 hats, at 4 dollars apiece,

and agreed to take his pay in flour at 6 dollars a barrel: how many barrels did he receive for his hats?

125. A cobbler sold 8 pair of boots at 5 dollars a pair, and took 4 tons of coal worth 9 dollars a ton, and the rest in cash: how much cash did he receive?

126. How many bunches of quills can I purchase, at 8 cents a bunch, for 12 slates worth 6 cents apiece?

127. In 7 times 8, how many times 6, and how many over?

128. In 9 times 5, how many times 7, and how many over?

129. In 7 times 9, how many times 6, and how many over?

130. In 8 times 9, how many times 10, and how many over?

131. In 10 times 6, how many times 7, and how many over?

132. In 8 times 10, how many times 9, and how many over?

133. In 9 times 9, how many times 8, and how many over?

134. In 8 times 7, how many times 10, and how many over?

135. In 9 times 8, how many times 7, and how many over?

SECTION VII.

FRACTIONS.

LESSON I.

1. If I divide any number or thing, as an ap or a pear, into *two equal* parts, what is each of th parts called?

Ans. One half.

2. What is then meant by *one half?*

3. How many *halves* make a *whole* one?

Ans. Two.

4. If I cut a sheet of paper into halves and g you 1 half, what part of the sheet shall I have le If I give you 2 halves, how much would be left?

Note.—The meaning of the terms *one half, one third, fourth,* &c., should be illustrated to the pupil by actually cut some familiar object, as an apple or a pear, into *halves, thi fourths,* &c. In this way, he will easily comprehend the me ing of the terms used in fractions, and will be able to perf operations in them with as much facility as in whole number

5. If any number or thing is divided into *th equal* parts, what is each of the parts called?

Ans. One third.

6. What then is meant by *one third?* What meant by *two thirds?*

7. If I cut an apple into thirds and give awa third, what part will be left? If I give away 2 thi what part will be left?

8. How many *thirds* make a whole one?

9. If a number or thing is divided into *four* eq parts, what is each of the parts called?

Ans. One fourth, or one quarter.

10. What is meant by 2 fourths? By 3 fourt

11. If you divide a stick of candy in fourths, and give 3 fourths of it to your companions, what part of it would you have left?

12. If you give away 1 fourth, what part would be left?

13. Two fourths and one fourth make how many fourths? Three fourths and one fourth, make how many fourths?

14. How many *fourths* make a whole one?

LESSON II.

1. What is meant by 1 fifth?

Ans. When any thing is divided into *five equal* parts, one of these parts is called 1 fifth.

2. What is meant by 2 fifths? By 3 fifths? By 4 fifths?

3. If you cut a pie into fifths, and take away 2 fifths, how many fifths will remain?

4. 3 fifths and 2 fifths make how many fifths?

5. How many *fifths* make a whole one?

6. What is meant by 1 sixth? By 2 sixths? By 5 sixths? By 3 sixths?

7. James had 2 sixths of a dollar, and his father gave him 3 sixths more: what part of a dollar had he then?

8. How many *sixths* make a whole one?

9. What is meant by 1 seventh? By 2 sevenths? By 3 sevenths? By 5 sevenths?

10. What part of a dollar will 2 sevenths and 4 sevenths make?

11. A man hoed 3 sevenths of an acre of corn in one day, and 2 sevenths of an acre the next day: *what part of* an acre did he hoe in both days?

12. How many *sevenths* make a whole one?

13. What is meant by 1 eighth? By 2 eighths? By 3 eighths? By 5 eighths? By 7 eighths?

14. How many *eighths* make a whole one?

15. What is meant by 1 ninth? By 2 ninths? By 8 ninths?

16. How many *ninths* make a whole one?

17. What is meant by 3 tenths? By 5 tenths? By 7 tenths?

18. What is meant by 1 fifteenth? By 2 fifteenths? By 3 fifteenths? By 7 fifteenths? By 10 fifteenths?

19. What is meant by 1 twentieth? By 2 twentieths? By 8 twentieths? By 12 twentieths?

20. How many *thirtieths* make a whole one? How many *forty-fifths* make a whole one? How many *sixty-fourths* make a whole one? How many *hundredths* make a whole one?

LESSON III.

1. If one half of a pear costs 1 cent, how much will two halves or a whole pear cost?

Suggestion.—2 halves or a whole pear will cost twice as much as 1 half. Now if 1 half costs 1 cent, 2 halves or a whole one will cost 2 times 1 cent, and 2 times 1 cent are 2 cents. *Ans.* 2 cents.

2. If 1 half an orange costs 2 cents, how much will a whole orange cost?

3. If 1 half a yard of ribbon costs 3 cents, what will a whole yard cost?

4. If 1 third of a pie costs 2 cents, how much will 2 thirds of a pie cost? How much will 3 thirds or a whole pie cost?

5. If 1 fourth of a pound of sugar costs 2 cents,

how much will 2 fourths cost? 3 fourths? A whole pound?

6. A man sold 1 fifth of a cord of wood for 3 shillings: how much would 3 fifths come to at the same rate? A whole cord?

7. If 1 sixth of a barrel of flour costs 1 dollar, how much will 4 sixths of a barrel cost? 6 sixths?

8. If 1 seventh of a ton of hay is worth 2 dollars, what is 3 sevenths worth? 4 sevenths? 6 sevenths? 7 sevenths?

9. If 1 eighth of a yard of cloth costs 1 dollar, how much will 5 eighths cost? 3 eighths? 7 eighths? 8 eighths?

10. If 1 ninth of an acre of land is worth 3 dollars, how much is 4 ninths worth? 5 ninths? 7 ninths? 8 ninths?

11. One tenth of a hogshead of molasses is worth 3 dollars: how much is 5 tenths of a hogshead worth? 7 tenths? 9 tenths? How much is a hogshead worth?

LESSON IV.

1. If a yard of tape is worth 2 cents, how much is 1 half a yard worth?

Solution.—Since a whole yard is worth 2 cents, 1 half of a yard is worth 1 half as much: and 1 half of 2 cents is 1 cent. *Ans.* 1 cent.

2. What is 1 half of 4 cents? *Ans.* 2 cents.

Why?

Ans. If 4 cents are divided into two equal parts, one of the parts is 2 cents.

3. If an orange costs 4 cents, how much will half an orange cost?

4. What is 1 half of 6 cents? What is 1 half of 8 cents? Of 10 cents? Of 12 cents? Of 16 cents? Of 20 cents?

5. If a lemon costs 6 cents, how much will 1 third of a lemon cost? What is 1 third of 6 cents?

6. What is 1 third of 9 cents? What is 1 third of 12 cents? Of 18 cents? Of 15 cents? Of 24 cents? Of 30 cents?

Observation.—From the preceding examples, the learner will perceive that a *half* of a number is equal to as many units as 2 is contained times in that number; a *third* of a number is equal to as many units as 3 is contained times in that number; a *fourth* of a number is equal to as many units as 4 is contained times in that number, &c.

7. How do you find a *half* of a number?

Ans. Divide the number by 2.

8. How find a *third* of a number? How find a *fourth* of a number? A fifth? A sixth? A seventh? An eighth? A ninth? A tenth?

9. What is 1 fourth of 12 dollars? Of 16 dollars? Of 20? Of 32? Of 24? Of 28? Of 36? Of 40?

10. If a ton of coal is worth 10 dollars, what is 1 fifth of a ton worth?

11. What is 1 fifth of 15 dollars? Of 20 dollars? Of 30? Of 25? Of 40? Of 50?

12. What is one seventh of 7? Of 14? Of 28? Of 49? Of 70?

13. What is one eighth of 16? Of 24? Of 40? Of 80? Of 72?

14. What is 1 ninth of 9? Of 27? Of 18? Of 36? Of 45? Of 72? Of 90?

15. What is one tenth of 10? Of 30? Of 20? Of 60? Of 50? Of 100?

LESSON V.

1. How much will 2 apples cost, at 1 half a cent apiece?

Solution.—Since 1 apple costs 1 half a cent, 2 apples will cost 2 times as much: and 2 times 1 half are 2 halves, or a whole cent. *Ans.* 1 cent.

2. What cost 3 apples, at 1 half a cent apiece?

Solution.—If 1 apple costs 1 half a cent, 3 apples will cost three times as much, or 3 halves: and 3 halves are equal to 1 whole cent and 1 half. *Ans.* 1 cent and 1 half.

3. At 1 third of a dollar a bushel, how much will 6 bushels of oats cost?

4. What cost 2 pounds of tea, at 3 fourths of a dollar a pound? How much is 2 times 3 fourths?

5. In 8 fourths, how many whole ones? In 9 fourths, how many whole ones, and how many fourths over? In 13 fourths? In 15 fourths?

6. What cost 3 yards of flannel, at 2 fifths of a dollar a yard? How much is 3 times 2 fifths?

7. In 10 fifths, how many whole ones? In 12 fifths? In 15 fifths? In 20 fifths? In 32 fifths?

8. At 3 eighths of a dollar a bushel, how much will 4 bushels of apples come to?

9. In 24 eighths, how many whole ones? In 19 eighths? In 33 eighths? In 40 eighths?

10. At 7 tenths of a dollar a pair, how much will 3 pair of gloves come to?

11. How much is 3 times 4 fifths?

12. How much is 4 times 6 eighths?

13. How much is 7 times 4 tenths?

14. How much is 5 times 7 ninths?

LESSON VI.

1. What part of 2 cents is 1 cent? *Ans.* 1 half. Why?

Ans. Because, if we divide 2 cents into *two* equal parts, one of these parts is 1 cent; and when any thing is divided into two equal parts, one of these parts is called 1 *half*.

2. What part of 3 cents is 1 cent? Why?

3. What part of 3 cents is 2 cents?

Solution.—Since 1 is 1 third part of 3, 2 is 2 times as much: and 2 times 1 third are 2 thirds. *Ans.* 2 thirds.

4. What part of 3 is 4?

Ans. 4 thirds of 3, which are equal to 1 and 1 third.

5. What part of 4 pears is 1 pear? What part of 4 is 2? Is 3? Is 5? Is 8? Is 9? Is 12?

6. What part of 5 dollars is 1 dollar? What part of 5 is 2? Is 3? Is 4? Is 6? Is 8? Is 10? Is 12? Is 15? Is 20?

7. What part of 6 pins is 1 pin? What part of 6 is 2? Is 3? Is 5? Is 7? Is 8? Is 12? Is 18?

8. What part of 8 apples is 1 apple? What part of 8 is 2? Is 3? Is 5? Is 7? Is 16? Is 20?

9. What part of 7 days is 1 day? What part of 7 is 2? Is 3? Is 6? Is 8? Is 14? Is 18?

10. What part of 10 nuts is 1 nut? What part of 10 is 2? Is 5? Is 3? Is 25? Is 30? Is 35?

11. What part of 12 pence is 1 penny? What part of 12 is 2? Is 3? Is 6? Is 18? Is 24? Is 28? Is 30? Is 47?

12. What part of 16 ounces is 1 ounce? What part of 16 is 2? Is 5? Is 10? Is 12? Is 16? Is 18? Is 25?

13. What part of 20 shillings is 1 shilling? What part of 20 is 3? Is 7? Is 10? Is 40?

14. What part of 30 is 1? Is 2? Is 5? Is 26? Is 35? Is 48?

15. What part of 100 is 1? Is 3? Is 10? Is 50? Is 73? Is 85?

LESSON VII.

1. If you can buy an orange for 4 cents, what part of an orange can you buy for 1 cent?

Solution.—1 cent is 1 fourth part of 4 cents: 1 cent will therefore buy 1 fourth as much as 4 cents. Now if 4 cents will buy a whole orange, 1 cent will buy 1 fourth part of an orange. *Ans.* 1 fourth of an orange.

2. At 6 shillings a pound, what part of a pound of tea can be bought for 1 shilling? For 2 shillings? For 3 shillings? For 5 shillings?

3. At 8 cents a pound, what part of a pound of saleratus can you buy for 1 cent? For 2 cents? For 3 cents? For 5 cents? For 7 cents? For 8 cents?

4. Seven days make a week: what part of a week is 1 day? What part of a week is 2 days? 3 days? 6 days? 5 days?

5. At 8 cents a yard, what part of a yard of calico can you buy for 1 cent? For 5 cents? For 6 cents? For 7 cents?

6. At 6 cents a yard, how much calico can you buy for 7 cents?

Suggestion.—Since 6 cents will buy 1 yard, 1 cent will buy 1 sixth of a yard; and 7 cents will buy 7 times as much: now 7 times 1 sixth is 7 sixths, equal to 1 whole one and 1 sixth.

Ans. 1 yard and 1 sixth of a yard.

7. At 5 cents a yard, what part of a yard of silk braid can you buy for 1 cent? How much can you buy for 5 cents? For 6 cents? For 10 cents?

8. At 10 dollars an acre, what part of an acre of land can you buy for 1 dollar? For 3 dollars? For 12 dollars? For 15 dollars? For 20 dollars?

9. What part of a pound of butter, at 12 cents a pound, can be bought for 1 cent? For 5 cents? For 15 cents?

10. At 15 cents a pound, what part of a pound of figs can you buy for 1 cent? For 16 cents?

11. Twenty shillings make a pound: what part of a pound is 1 shilling? 2 shillings? 15 shillings? 20 shillings? 22 shillings? 30 shillings?

LESSON VIII.

1. What will 2 oranges cost, at 3 and 1 half cents apiece?

Solution.—If 1 orange costs 3 and 1 half cents, 2 oranges will cost twice as much: and 2 times 3 cents are 6 cents, and 2 times 1 half are 2 halves, equal to 1 cent. Now 1 cent and 6 cents are 7 cents. *Ans.* 7 cents.

2. What will 5 yards of tape cost, at 2 and 1 third cents a yard?

Solution.—Since 1 yard of tape cost 2 and 1 third cents, 5 yards will cost 5 times as much: and 5 times 2 cents are 10 cents: and 5 times 1 third are 5 thirds, equal to 1 cent and 2 thirds. Now 1 and 2 thirds cents added to 10 cents, makes 11 and 2 thirds cents. *Ans.* 11 and 2 thirds cents.

3. What will 4 pounds of beef cost, at 3 and 1 half cents a pound?

4. What cost 6 yards of cloth, at 2 and 1 half dollars per yard? How much is 6 times 2 and 1 half?

5. At 3 shillings a yard, what will 4 and 2 thirds yards of ribbon come to?

6. Sarah bought 8 and 3 fourths yards of cashmere, at 4 shillings a yard: how much did it come to?

7. A farmer bought 10 sheep, at 2 and 1 third dollars a head: how much did they come to?

8. In 1 rod there are 5 and 1 half yards: how many yards are there in 8 rods?

9. How much is 5 times 4 and 3 fourths?

10. How much is 7 times 6 and 4 sevenths?

11. How much is 6 times 4 and 3 ninths?

12. How much is 8 times 5 and 5 sixths?

LESSON IX.

1. If 1 barrel of flour costs 9 dollars, how much will 2 thirds of a barrel cost?

Solution.—First find the cost of 1 third, then of 2 thirds. (See Observation, p. 88.)

If one barrel costs 9 dollars, 1 third of a barrel will cost 1 third of 9 dollars. Now 1 third of 9 dollars is 3 dollars, and 2 thirds will be twice as much; and 2 times 3 dollars are 6 dollars.

Ans. 6 dollars.

2. If 1 yard of cloth costs 6 dollars, how much will 2 thirds of a yard cost?

3. How much is 2 thirds of 6? Of 9? Of 12?

4. If a pie costs 12 cents, what will 3 fourths of a pie cost? How much is 3 fourths of 12?

5. How much will 2 fifths of a ton of coal cost, at 10 dollars a ton? How much will 4 fifths of a ton cost?

6. How much will 3 sevenths of an acre of land cost, at 21 dollars per acre?

7. If a ton of hay costs 16 dollars, what will 5 eighths of a ton cost?

8. If a drum of figs costs 18 shillings, how much will 2 ninths of a drum cost? 4 ninths?

9. At 20 shillings a barrel, how much will 4 fifths of a barrel of cider cost?

10. How much is 3 fourths of 4? Of 8? Of 16?

11. How much is 5 sevenths of 14? Of 21?

LESSON X.

1. *Q.* When a number or thing is divided into *equal parts*, as halves, thirds, fourths, &c., what are those parts called?

Ans. They are called FRACTIONS.

2. *Q.* How are fractions commonly written?

Ans. By two numbers, one above the other, with a line between them. For example:

One half	is written	thus,	$\frac{1}{2}$
One third	"	"	$\frac{1}{3}$
One fourth	"	"	$\frac{1}{4}$
One fifth	"	"	$\frac{1}{5}$
Three fifths	"	"	$\frac{3}{5}$
One sixth	"	"	$\frac{1}{6}$
Five sixths	"	"	$\frac{5}{6}$, &c.

3. *Q.* When we express *one half* by figures, thus $\frac{1}{2}$, what does the figure 2, which is placed below the line, show?

Ans. The 2 shows that the number or thing is *divided into two* equal parts.

4. *Q.* What does the 1 placed above the line, show?

Ans. It shows that *one* of those parts is denoted by the fraction.

5. *Q.* In the expression $\frac{3}{5}$, what does the 5, which is placed below the line, show?

Ans. It shows that the number or thing is divided into *five* equal parts.

6. *Q.* What does the 3 above the line show?

Ans. It shows that *three* of those parts are denoted by the fraction.

7. *Q.* What is the number below the line called?

Ans. It is called the DENOMINATOR.

8. *Q.* What does it show?

Ans. It shows into *how many equal parts* the number or thing *is divided.*

9. *Q.* What is the number above the line called?

Ans. It is called the NUMERATOR.

10. *Q.* What does it show?

Ans. It shows *how many* parts are expressed by the fraction.

N. B. The number below the line is called the *denominator*, because it gives the name, as halves, thirds, fifths, &c., to the fraction. The number above the line is called the *numerator*, because it numbers the parts, or shows how many parts are expressed by the fraction.

Note.—Particular pains should here be taken to explain to the young pupil, by some visible illustration, what the *denominator* and *numerator* signify. (See Note, p. 84.)

11. *Q.* When a whole number and a fraction are written together, as $2\frac{1}{2}$, $4\frac{3}{5}$, &c., what is the expression called?

Ans. It is called a *mixed number.*

12. *Q.* What then is a mixed number?

13. How are the expressions $2\frac{1}{2}$, and $4\frac{3}{5}$, read?

Ans. $2\frac{1}{2}$ is read, *Two and a half;* and $4\frac{3}{5}$, *Four and two thirds.*

14. Read the following: $3\frac{1}{2}$; $4\frac{3}{4}$; $8\frac{1}{8}$; $7\frac{3}{4}$; $10\frac{1}{2}$.

MISCELLANEOUS EXAMPLES.

1. Henry had $\frac{3}{4}$ of a dollar, and his father gave him $\frac{1}{4}$, and his mother $\frac{3}{4}$ of a dollar more; how much money had he then?

Solution.—3 fourths and 1 fourth are 4 fourths, and 3 fourths make 7 fourths. *Ans.* $\frac{7}{4}$ of a dollar.

Note.—When the numerator is *equal to*, or *greater* than the denominator, the fraction is called an *improper* fraction. Thus $\frac{7}{4}$ is an improper fraction, and is equal to $1\frac{3}{4}$. So $\frac{3}{3}$ is an improper fraction, and is equal to 1.

2. If you have $\frac{5}{8}$ of a dollar, and earn $\frac{7}{8}$, and find $\frac{4}{8}$ of a dollar more, how much money will you have?

3. A merchant sold a bushel of corn for $\frac{8}{10}$ of a dollar, a gallon of molasses for $\frac{3}{10}$ of a dollar, and a pound of tea for $\frac{5}{10}$ of a dollar: how much did he receive for all?

4. How much are $\frac{3}{5}$, and $\frac{7}{5}$, and $\frac{5}{5}$, and $\frac{1}{5}$?

5. How much are $\frac{2}{9}$, and $\frac{4}{9}$, and $\frac{7}{9}$, and $\frac{8}{9}$?

6. How much are $\frac{9}{12}$, and $\frac{3}{12}$, and $\frac{7}{12}$, and $\frac{10}{12}$?

7. If you have $\frac{7}{8}$ of a dollar, and lose $\frac{5}{8}$ of a dollar, how much will you have left?

Solution.—5 eighths from 7 eighths leave 2 eighths. *Ans.* $\frac{2}{8}$ of a dollar.

8. If you have $\frac{4}{5}$ of an orange, and give away $\frac{3}{5}$, how much will you have left?

9. If you have a whole orange and give away $\frac{1}{4}$ of it, how much will you have left?

10. Take $\frac{3}{7}$ from $\frac{5}{7}$.

11. Take $\frac{4}{9}$ from $\frac{8}{9}$.

12. Take $\frac{8}{11}$ from $\frac{10}{11}$.

13. Take $\frac{1}{8}$ from $\frac{3}{8}$.

14. Take $\frac{10}{16}$ from $\frac{16}{16}$.

15. Take $\frac{9}{15}$ from $\frac{14}{15}$.

16. If a pear costs 2 cents, how much will $\frac{1}{2}$ of a pear cost?

Solution.—Since a whole pear costs 2 cents, 1 *half* of a pear will cost *half* as much; and half of 2 cents is 1 cent. *Ans.* 1 cent.

17. What will $\frac{1}{2}$ of a barrel of flour cost, at 6 dollars a barrel?

18. What will $\frac{1}{3}$ of a pound of starch cost, at 9 cents a pound?

19. What cost $\frac{1}{4}$ of a pound of sugar, at 8 cents a pound?

20. What cost $\frac{1}{5}$ of a pound of honey, at 10 cents a pound? $\frac{2}{5}$ of a pound? $\frac{4}{5}$ of a pound?

21. What cost $\frac{1}{4}$ of a hogshead of molasses, at 30 dollars a hogshead?

22. At 6 dollars a barrel, what will $\frac{1}{4}$ of a barrel of beef cost? What will $\frac{1}{3}$ of a barrel cost?

23. At 8 cents a pound, what will $\frac{1}{2}$ of a pound of lard cost? $\frac{1}{4}$ of a pound?

24. At 12 cents a yard, how much will $\frac{1}{3}$ of a yard of cambric cost? $\frac{1}{2}$ of a yard? $\frac{1}{4}$ of a yard?

25. At 16 cents a pound, how much will $\frac{1}{4}$ of a pound of raisins cost? $\frac{1}{2}$ of a pound? $\frac{1}{8}$ of a pound?

26. At 18 cents apiece, how much will $\frac{1}{2}$ a watermelon cost? $\frac{1}{3}$ of a watermelon? $\frac{1}{6}$ of a watermelon?

27. At 24 dollars an acre, how much will $\frac{1}{8}$ of an acre of land cost? $\frac{1}{4}$ of an acre? $\frac{1}{2}$ of an acre? $\frac{1}{3}$ of an acre?

28. If a box of lemons costs 30 shillings, how much will $\frac{1}{2}$ of a box cost? $\frac{1}{3}$ of a box? $\frac{1}{5}$ of a box? $\frac{1}{4}$ of a box? $\frac{1}{10}$ of a box?

29. At $\frac{3}{4}$ of a cent a yard, how much will 9 yards of tape cost?

Solution.—If 1 yard costs $\frac{3}{4}$ of a cent, 9 yards will cost 9 times as much; and 9 times $\frac{3}{4}$ are 27 fourths, which are equal to 6 and 3 fourths. *Ans.* $6\frac{3}{4}$ cents.

30. At $\frac{5}{6}$ of a penny apiece, how much will 10 apples cost?

31. At $\frac{7}{8}$ of a dollar a basket, how much will 8 baskets of peaches cost?

32. What will seven pounds of cinnamon cost, at $\frac{9}{10}$ of a dollar a pound?

33. What cost 10 pounds of wool at $\frac{4}{5}$ of a dollar a pound?

34. What cost 7 pounds of lard, at $8\frac{1}{2}$ cents a pound?

Solution.—If 1 pound costs $8\frac{1}{2}$ cents, 7 pounds will cost 7 times as much: now 7 times 8 are 56, and 7 times 1 half are 7 halves, which are equal to 3 and 1 half; and $3\frac{1}{2}$ added to 56 make $59\frac{1}{2}$. *Ans.* $59\frac{1}{2}$ cents.

35. What cost 6 yards of cloth, at $5\frac{1}{2}$ dollars per yard?

36. If I ride $7\frac{3}{4}$ miles an hour, how far can I ride in 7 hours?

37. A man bought 6 pounds of beef, at $8\frac{1}{2}$ cents a pound: how much did he pay for his beef?

38. How much is 5 times $6\frac{3}{4}$?

39. How much is 6 times $4\frac{3}{5}$?

40. How much is 4 times $9\frac{3}{7}$?

41. How much is 8 times $6\frac{1}{2}$?

42. How much is 7 times $10\frac{3}{4}$?

43. How much is 9 times $8\frac{6}{10}$?

44. If 1 yard of cloth costs 2 dollars, how much will $\frac{1}{3}$ of a yard cost?

Solution.—Since 1 yard costs 2 dollars, 1 third *of a yard will* cost 1 third of 2 dollars. Now 1 third

of 2 dollars is equal to 2 thirds of 1 dollar; for, 1 third of 1 is 1 third, and 1 third of 2 must be 2 times 1 third, which is 2 thirds. *Ans.* $\frac{2}{3}$ of a dollar.

45. If 1 yard of ribbon costs 7 cents, what will $\frac{1}{4}$ of a yard cost?

Solution.—Reasoning as before, $\frac{1}{4}$ of a yard will cost $\frac{1}{4}$ of 7 cents. But $\frac{1}{4}$ of 7 is equal to $\frac{7}{4}$ of 1, or simply to 7 fourths, which is 1 and 3 fourths. *Ans.* $1\frac{3}{4}$ cents.

46. How much will $\frac{1}{8}$ of a barrel of pork cost, at 8 dollars a barrel?

47. What is 1 half of 11?

48. What is 1 third of 14?

49. What is 1 half of 17?

50. What is 1 third of 16?

51. What is 1 fourth of 21?

52. What is 1 fifth of 27?

53. How much will $\frac{1}{6}$ of a pound of figs cost, at 15 cents a pound?

54. What cost $\frac{1}{7}$ of a barrel of beer, at 11 dollars a barrel?

55. What will $\frac{1}{8}$ of a ton of hay cost, which is worth 19 dollars per ton?

56. What will $\frac{1}{7}$ of a cord of wood cost, at 23 shillings per cord?

57. If a man can walk 35 miles in a day, how far can he walk in $\frac{1}{5}$ of a day?

58. James, having 38 apples, gave $\frac{1}{6}$ of them for a slate: how many apples did his slate cost him?

59. What is 1 sixth of 40?

60. What is 1 seventh of 39?

61. What is 1 tenth of 63?

62. What is 1 eighth of 74?

63. What is 1 ninth of 85?

LESSON VI.

1. What part of 2 cents is 1 cent? *Ans.* 1 half. Why?

Ans. Because, if we divide 2 cents into *two* equal parts, one of these parts is 1 cent; and when any thing is divided into two equal parts, one of these parts is called 1 *half*.

2. What part of 3 cents is 1 cent? Why?

3. What part of 3 cents is 2 cents?

Solution.—Since 1 is 1 third part of 3, 2 is 2 times as much: and 2 times 1 third are 2 thirds. *Ans.* 2 thirds.

4. What part of 3 is 4?

Ans. 4 thirds of 3, which are equal to 1 and 1 third.

5. What part of 4 pears is 1 pear? What part of 4 is 2? Is 3? Is 5? Is 8? Is 9? Is 12?

6. What part of 5 dollars is 1 dollar? What part of 5 is 2? Is 3? Is 4? Is 6? Is 8? Is 10? Is 12? Is 15? Is 20?

7. What part of 6 pins is 1 pin? What part of 6 is 2? Is 3? Is 5? Is 7? Is 8? Is 12? Is 18?

8. What part of 8 apples is 1 apple? What part of 8 is 2? Is 3? Is 5? Is 7? Is 16? Is 20?

9. What part of 7 days is 1 day? What part of 7 is 2? Is 3? Is 6? Is 8? Is 14? Is 18?

10. What part of 10 nuts is 1 nut? What part of 10 is 2? Is 5? Is 3? Is 25? Is 30? Is 35?

11. What part of 12 pence is 1 penny? What part of 12 is 2? Is 3? Is 6? Is 18? Is 24? Is 28? Is 30? Is 47?

12. What part of 16 ounces is 1 ounce? What part of 16 is 2? Is 5? Is 10? Is 12? Is 16? Is 18? Is 25?

13. What part of 20 shillings is 1 shilling? What part of 20 is 3? Is 7? Is 10? Is 40?

14. What part of 30 is 1? Is 2? Is 5? Is 26? Is 35? Is 48?

15. What part of 100 is 1? Is 3? Is 10? Is 50? Is 73? Is 85?

LESSON VII.

1. If you can buy an orange for 4 cents, what part of an orange can you buy for 1 cent?

Solution.—1 cent is 1 fourth part of 4 cents: 1 cent will therefore buy 1 fourth as much as 4 cents. Now if 4 cents will buy a whole orange, 1 cent will buy 1 fourth part of an orange. *Ans.* 1 fourth of an orange.

2. At 6 shillings a pound, what part of a pound of tea can be bought for 1 shilling? For 2 shillings? For 3 shillings? For 5 shillings?

3. At 8 cents a pound, what part of a pound of saleratus can you buy for 1 cent? For 2 cents? For 3 cents? For 5 cents? For 7 cents? For 8 cents?

4. Seven days make a week: what part of a week is 1 day? What part of a week is 2 days? 3 days? 6 days? 5 days?

5. At 8 cents a yard, what part of a yard of calico can you buy for 1 cent? For 5 cents? For 6 cents? For 7 cents?

6. At 6 cents a yard, how much calico can you buy for 7 cents?

Suggestion.—Since 6 cents will buy 1 yard, 1 cent will buy 1 sixth of a yard; and 7 cents will buy 7 times as much: now 7 times 1 sixth is 7 sixths, equal to 1 whole one and 1 sixth.

Ans. 1 yard and 1 sixth of a yard.

7. At 5 cents a yard, what part of a yard of silk braid can you buy for 1 cent? How much can you buy for 5 cents? For 6 cents? For 10 cents?

8. At 10 dollars an acre, what part of an acre of land can you buy for 1 dollar? For 3 dollars? For 12 dollars? For 15 dollars? For 20 dollars?

9. What part of a pound of butter, at 12 cents a pound, can be bought for 1 cent? For 5 cents? For 15 cents?

10. At 15 cents a pound, what part of a pound of figs can you buy for 1 cent? For 16 cents?

11. Twenty shillings make a pound: what part of a pound is 1 shilling? 2 shillings? 15 shillings? 20 shillings? 22 shillings? 30 shillings?

LESSON VIII.

1. What will 2 oranges cost, at 3 and 1 half cents apiece?

Solution.—If 1 orange costs 3 and 1 half cents, 2 oranges will cost twice as much: and 2 times 3 cents are 6 cents, and 2 times 1 half are 2 halves, equal to 1 cent. Now 1 cent and 6 cents are 7 cents. *Ans.* 7 cents.

2. What will 5 yards of tape cost, at 2 and 1 third cents a yard?

Solution.—Since 1 yard of tape cost 2 and 1 third cents, 5 yards will cost 5 times as much: and 5 times 2 cents are 10 cents: and 5 times 1 third are 5 thirds, equal to 1 cent and 2 thirds. Now 1 and 2 thirds cents added to 10 cents, makes 11 and 2 thirds cents. *Ans.* 11 and 2 thirds cents.

3. What will 4 pounds of beef cost, at 3 and 1 half cents a pound?

4. What cost 6 yards of cloth, at 2 and 1 half dollars per yard? How much is 6 times 2 and 1 half?

5. At 3 shillings a yard, what will 4 and 2 thirds yards of ribbon come to?

6. Sarah bought 8 and 3 fourths yards of cashmere, at 4 shillings a yard: how much did it come to?

7. A farmer bought 10 sheep, at 2 and 1 third dollars a head: how much did they come to?

8. In 1 rod there are 5 and 1 half yards: how many yards are there in 8 rods?

9. How much is 5 times 4 and 3 fourths?

10. How much is 7 times 6 and 4 sevenths?

11. How much is 6 times 4 and 3 ninths?

12. How much is 8 times 5 and 5 sixths?

LESSON IX.

1. If 1 barrel of flour costs 9 dollars, how much will 2 thirds of a barrel cost?

Solution.—First find the cost of 1 third, then of 2 thirds. (See Observation, p. 88.)

If one barrel costs 9 dollars, 1 third of a barrel will cost 1 third of 9 dollars. Now 1 third of 9 dollars is 3 dollars, and 2 thirds will be twice as much; and 2 times 3 dollars are 6 dollars.

Ans. 6 dollars.

2. If 1 yard of cloth costs 6 dollars, how much will 2 thirds of a yard cost?

3. How much is 2 thirds of 6? Of 9? Of 12?

4. If a pie costs 12 cents, what will 3 fourths of a pie cost? How much is 3 fourths of 12?

5. How much will 2 fifths of a ton of coal cost, at 10 dollars a ton? How much will 4 fifths of a ton cost?

6. How much will 3 sevenths of an acre of land cost, at 21 dollars per acre?

7. If a ton of hay costs 16 dollars, what will 5 eighths of a ton cost?

8. If a drum of figs costs 18 shillings, how much will 2 ninths of a drum cost? 4 ninths?

9. At 20 shillings a barrel, how much will 4 fifths of a barrel of cider cost?

10. How much is 3 fourths of 4? Of 8? Of 16?

11. How much is 5 sevenths of 14? Of 21?

LESSON X.

1. *Q.* When a number or thing is divided into *equal parts*, as halves, thirds, fourths, &c., what are those parts called?

Ans. They are called FRACTIONS.

2. *Q.* How are fractions commonly written?

Ans. By two numbers, one above the other, with a line between them. For example:

One half	is written	thus,	$\frac{1}{2}$
One third	"	"	$\frac{1}{3}$
One fourth	"	"	$\frac{1}{4}$
One fifth	"	"	$\frac{1}{5}$
Three fifths	"	"	$\frac{3}{5}$
One sixth	"	"	$\frac{1}{6}$
Five sixths	"	"	$\frac{5}{6}$, &c.

3. *Q.* When we express *one half* by figures, thus $\frac{1}{2}$, what does the figure 2, which is placed below the line, show?

Ans. The 2 shows that the number or thing is divided into *two* equal parts.

4. *Q.* What does the 1 placed above the line, show?

Ans. It shows that *one* of those parts is denoted by the fraction.

5. *Q.* In the expression $\frac{3}{5}$, what does the 5, which is placed below the line, show?

Ans. It shows that the number or thing is divided into *five* equal parts.

6. *Q.* What does the 3 above the line show?

Ans. It shows that *three* of those parts are denoted by the fraction.

7. *Q.* What is the number below the line called?

Ans. It is called the DENOMINATOR.

8. *Q.* What does it show?

Ans. It shows into *how many equal parts* the number or thing *is divided.*

9. *Q.* What is the number above the line called?

Ans. It is called the NUMERATOR.

10. *Q.* What does it show?

Ans. It shows *how many* parts are expressed by the fraction.

N. B. The number below the line is called the *denominator*, because it gives the name, as halves, thirds, fifths, &c., to the fraction. The number above the line is called the *numerator*, because it numbers the parts, or shows how many parts are expressed by the fraction.

Note.—Particular pains should here be taken to explain to the young pupil, by some visible illustration, what the *denominator* and *numerator* signify. (See Note, p. 84.)

11. *Q.* When a whole number and a fraction are written together, as $2\frac{1}{2}$, $4\frac{2}{3}$, &c., what is the expression called?

Ans. It is called a *mixed number.*

12. *Q.* What then is a mixed number?

13. How are the expressions $2\frac{1}{2}$, and $4\frac{2}{3}$, read?

Ans. $2\frac{1}{2}$ is read, *Two and a half;* and $4\frac{2}{3}$, *Four and two thirds.*

14. Read the following: $3\frac{1}{2}$; $4\frac{3}{4}$; $8\frac{4}{5}$; $7\frac{2}{3}$; $10\frac{6}{7}$.

SQUARE MEASURE.

VIII. *Square Measure* is used in measuring surfaces, or things whose length and breadth are considered without regard to height or depth; as land, flooring, plastering, &c.

144 square inches (*sq. in.*)	make	1 square foot,	marked *sq. ft.*
9 square feet	"	1 square yard,	" *sq. yd.*
30¼ square yards, or 272¼ square feet	"	1 sq. rod, perch, or pole,	" *sq. r.*
40 square rods	"	1 rood,	" *R.*
4 roods, or 160 square rods	"	1 acre,	" *A.*
640 acres	"	1 square mile,	" *M.*

CUBIC MEASURE.

IX. *Cubic Measure* is used in measuring solid bodies, or things which have length, breadth, and thickness, as timber, stone, boxes of goods, the capacity of rooms, &c.

1728 cubic inches (*cu. in.*)	make	1 cubic foot,	marked *cu. ft.*
27 cubic feet	"	1 cubic yard,	" *cu. yd.*
40 feet of round, or 50 ft. of hewn timber	"	1 ton,	" *T.*
16 cubic feet	"	1 foot of wood, or a cord foot	" *s. ft.*
8 cord feet, or 128 cubic feet	"	1 cord,	" *C.*

Note.—A pile of wood 8 feet long, 4 feet wide, and 4 feet high, contains 1 cord. For, 8 into 4 into 4 is equal to 128.

WINE MEASURE.

X. *Wine Measure* is used in measuring wine, alcohol, molasses, oil, and all other liquids except beer, ale, and milk.

4 gills (*gi.*)	make	1 pint,	marked *pt.*
2 pints	"	1 quart,	" *qt.*
4 quarts	"	1 gallon,	" *gal.*
31½ gallons	"	1 barrel,	" *bar.*, or *bbl.*
42 gallons	"	1 tierce,	" *tier.*
63 gallons, or 2 barrels	"	1 hogshead,	" *hhd.*
2 hogsheads	"	1 pipe or butt,	" *pi.*
2 pipes	"	1 tun,	" *tun.*

BEER MEASURE.

XI. *Beer Measure* is used in measuring beer, ale and milk.

2 pints (*pts.*)	make	1 quart,	marked *qt.*
4 quarts	"	1 gallon,	" *gal.*
36 gallons	"	1 barrel,	" *bar.* or *bbl.*
1½ barrels, or 54 gals.,	"	1 hogshead,	" *hhd.*

DRY MEASURE.

XII. *Dry Measure* is used in measuring grain, fruit, salt, &c.

2 pints (*pt.*)	make	1 quart,	marked	*qt.*
8 quarts	"	1 peck,	"	*pk.*
4 pecks or 32 qts.	"	1 bushel,	"	*bu.*
8 bushels	"	1 quarter,	"	*qr.*
32 bushels	"	1 chaldron,	"	*ch.*

Note.—In England, 36 bushels make a chaldron.

TIME.

XIII. *Time* is naturally divided into days and years; the former are caused by the revolution of the Earth on its axis, the latter by its revolution round the Sun.

60 seconds (*sec.*)	make	1 minute,	marked	*min.*
60 minutes	"	1 hour,	"	*hr.*
24 hours	"	1 day,	"	*d.*
7 days	"	1 week,	"	*wk.*
4 weeks	"	1 lunar month,	"	*mo.*
12 calendar months, or 365 days and 6 hours, (nearly,)	"	1 civil year,	"	*yr.*

The following are the names of the 12 calendar months into which the civil year is divided; with the number of days in each:

January,	(Jan.)	*first*	month,	has	31	days.
February,	(Feb.)	*second*	"	"	28	"
March,	(Mar.)	*third*	"	"	31	"
April,	(Apr.)	*fourth*	"	"	30	"
May,	(May)	*fifth*	"	"	31	"
June,	(Jun.)	*sixth*	"	"	30	"
July,	(July)	*seventh*	"	"	31	"
August,	(Aug.)	*eighth*	"	"	31	"
September,	(Sept.)	*ninth*	"	"	30	"
October,	(Oct.)	*tenth*	"	"	31	"
November,	(Nov.)	*eleventh*	"	"	30	"
December,	(Dec.)	*twelfth*	"	"	31	"

The number of days in each month may be easily remembered from the following lines:

" Thirty days hath September,
April, June, and November;
February, twenty-eight alone,
All the rest have thirty one;
Except in Leap year, then is the time,
When February has twenty-nine."

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CIRCULAR MEASURE OR MOTION.

XIV. *Circular Measure* is applied to the divisions of the circle, to latitude and longitude, and the motion of the heavenly bodies.

60 seconds (″)	make 1 minute, marked	′	
60 minutes	" 1 degree,	"	°
30 degrees	" 1 sign,	"	s.
12 signs, or 360°	" 1 circle,	"	c.

XV. MISCELLANEOUS TABLE.

12 units	make 1 dozen, (*doz.*)	
12 dozen, or 144	" 1 gross.	
12 gross, or 1728	" 1 great gross.	
20 units	" 1 score.	
56 pounds	" 1 firkin of butter.	
100 pounds	" 1 quintal of fish.	
196 pounds	" 1 barrel of flour.	
200 pounds	" 1 barrel of pork.	
24 sheets of paper	" 1 quire.	
20 quires	" 1 ream.	

A sheet of paper folded in two leaves, is called a *folio*.
A sheet folded in four leaves, is called a *quarto*, or 4to.
A sheet folded in eight leaves, is called an *octavo*, or 8vo.
A sheet folded in twelve leaves, is called a *duodecimo*, or 12mo.
A sheet folded in eighteen leaves, is called an 18mo.

Note.—Formerly 112 pounds were considered a quintal.

THE END.

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H. G. LEWIS, Secretary.

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